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NOVEMBER/DECEMBER 1990

# AVIATION DIGEST

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## L O N G B O W

# AVIATION DIGEST

PROFESSIONAL BULLETIN

1-90-6 • NOVEMBER/DECEMBER 1990



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*About the Cover:* **This issue focuses on two recent developments in weapons systems to update the warfighting capabilities of Army Aviation—Longbow Apache (cover) and the Armed OH-58D Warrior. The story of how the Army will integrate Longbow Apache into the combined arms team and increase its killing potential starts on page 2. On page 10, read how the Armed OH-58D Warrior will perform its multipurpose light helicopter mission.**


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**Major General Rudolph Ostovich III**
Chief, Army Aviation Branch

# Military Qualification Standard (MQS) System

EVERY OFFICER in the Aviation Branch knows the aircrew training manuals (ATMs). But, how many of you know the military qualification standards (MQSs)? This article explains the MQS system and challenges each commander and officer within the Aviation Branch to make the MQS acronym as familiar to members of their command as the term ATM.

The MQS system provides a framework and establishes the responsibilities and standards for common and specific training, education and professional development of Army officers. It also identifies the critical battle focused tasks, skills and knowledge that officers must master at each stage of their careers. Presently, the MQS system has three levels: MQS I, MQS II and MQS III. MQS I applies to precommissioning training; MQS II will apply to company grade officer training; and MQS III will apply to field grade officer training.

The MQS system identifies common and branch training requirements for officers. It has two components: a military task and knowledge component and a professional military education component. The military task and knowledge component provides the critical tasks on which officers must train, while the professional military education component focuses on improving cognitive skills.

Leader development results from the progressive and sequential education, training and experience officers receive throughout their careers. Leadership starts in the precommissioning phases of training; continues through commissioning, branch education and operational assignments; and stops only when officers complete their military service.

The leader development process depends on three pillars for its success: institutional training, operational assignments and self-development. Each of the pillars is mutually supporting. All three are required for a successful leader development process.

School commandants (and other proponents) are directly involved with the *institutional training pillar*. The training that company grade officers receive during the Officer Basic Course, Officer Advanced Course and the Combined Arms and Services Staff School falls into this category.

Unit commanders are directly involved with the *operational assignments pillar*. The MQS system provides the link between institutional training and operational assignments. The MQS helps commanders construct their unit training plans and design their junior officers' development programs to complement the training of their units' mission essential task list (METL). This is where the ATM and MQS become important tools for the Aviation Branch commander. The two systems complement each other when incorporated in the unit training plan.

The individual officer is most directly involved with the *self-development pillar*. It includes professional reading and self-study. The individual is the one ultimately responsible for his or her development as a leader. The professional military education component of MQS II is comprised of a reading program and, for selected officers, advanced civil schooling.

MQS II applies to company grade officers in the Active Army, U.S. Army Reserve and the Army National Guard. The goal of MQS II is to prepare company grade officers to accomplish their wartime tasks; provide the basis for promotion to major and attendance at Command and Staff

*continued on page 51*

# L O N G

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*Tactics used in this article are based on the authors' opinions of a still developing weapon system and are not official TRADOC or USAAVNC policy.*

THE DARKNESS is absolute, making it possible only to feel the mist in the air. It is 0200. A low ceiling hangs overhead, and fog is forming in some of the low-lying areas. The sound of turbine engines and rotor blades starting to turn breaks the sleepy night's quiet. Crews of AH-64 Apache attack helicopters are very much awake. This mission is one no one knew about yesterday—an opportunity no one expected. The warning orders were issued just 3 hours ago and mission

# B O W APACHE

data installed only minutes ago into the data transfer module (DTM) onboard the Apache, but these aviators have trained for this mission for years.

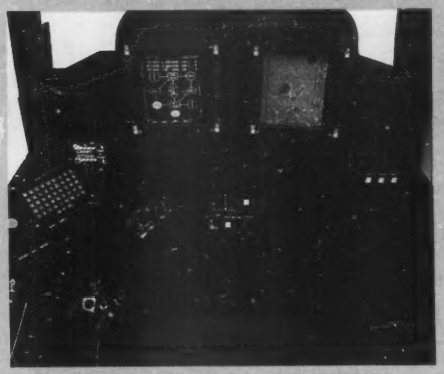
The enemy is marching in column through a named area of interest in which he was not expected to go. Intelligence preparation of the battlefield (IPB) says he should be headed in another direction; tomorrow's attack was planned for striking his columns farther west. But he is now heading south, tonight! Something must be done quickly. With these weather conditions, the only readily available weapon that can be there fast, with the required firepower to strike the enemy an accurate blow, is the Apache...and then only with Longbow.

This introductory scenario sets the stage for discussing employment of Longbow in a mid-intensity conflict. The reader observes the tactics, techniques and procedures that Longbow-equipped

units can employ to optimize the new weapon's capabilities. Longbow Apache is an evolutionary step forward in the modernization of weapons systems to assure the needed warfighting capabilities of the Aviation force.

The Longbow weapon system consists of a fire control radar (FCR) and a radio frequency interferometer (RFI), mounted on top of the Apache's main rotor mast, and radio frequency (RF) guided fire-and-forget missiles. All of these are operated from a Manpower and Personnel Integration (MANPRINT) crew station highlighted by four multifunction display screens. The FCR processor classifies and prioritizes targets and then displays them as a target page on one of the multifunction display screens. The FCR then transfers target data to the RF missiles, which can be fired accurately at enemy targets during periods of reduced visibility.

Aviators can use the FCR and RF missile during these periods of poor visibility when laser, optical and forward-looking infrared (FLIR) sensors are degraded. Engagements can be made without visually acquiring the targets or tracking the missile to them. Aircraft will not be endangered in an unmasked flight profile for long periods of time.



**The Longbow weapon system is operated from a MANPRINT crew station highlighted by four multifunction display screens.**

The Longbow Apache must be fully integrated into the combined arms team. It is envisioned that the Army will field Longbow Apache by whole battalions to facilitate the logistics, maintenance and training of a different model aircraft. The corps could contain Longbow Apache battalions that would be task organized with the corps' or divisions' AH-64A helicopter battalions.

To maximize Longbow's killing potential and optimize its advantages, the Army must review and modify attack helicopter tactics, techniques and procedures. Longbow offers Apache several advantages. We are most concerned with those for battlefield operations.

- Longbow is comprised of an accurate, true, fire-and-forget missile capable of operating during periods of degraded visibility.

- Longbow can provide real-time situational awareness and intelligence of the battlefield to the commander.

Even though the Longbow Apache would use different tactics, it can still be employed at any time in the same manner as the AH-64A helicopters, or with the AH-64A, as the situation requires.

**Mission Planning**

Longbow Apaches can react to an immediate need as in the introductory scenario. Premission planning, however, will be key in employing and controlling Longbow fires. To execute any mission, the crew needs volumes of critical information. Some of this information is standing operating procedure; other information is mission or time dependent. Longbow Apache systems are based on a data transfer module that quickly loads the mission data and initializes the aircraft systems for the mission.

The Mission Planning Station transfers the communications-electronics operating instructions information; performance planning, route and hazard and navigation waypoints; battle specific planning information; threat prioritization tables; known threat locations and targets directly to the

DTM for transfer to the Longbow Apache before takeoff. The DTM remains in the helicopter for storage of mission information. This information includes target locations, spot reports, helicopter performance, as well as the premission planned data. The DTM stores this mission history for debriefing and use in maintenance performance analysis.

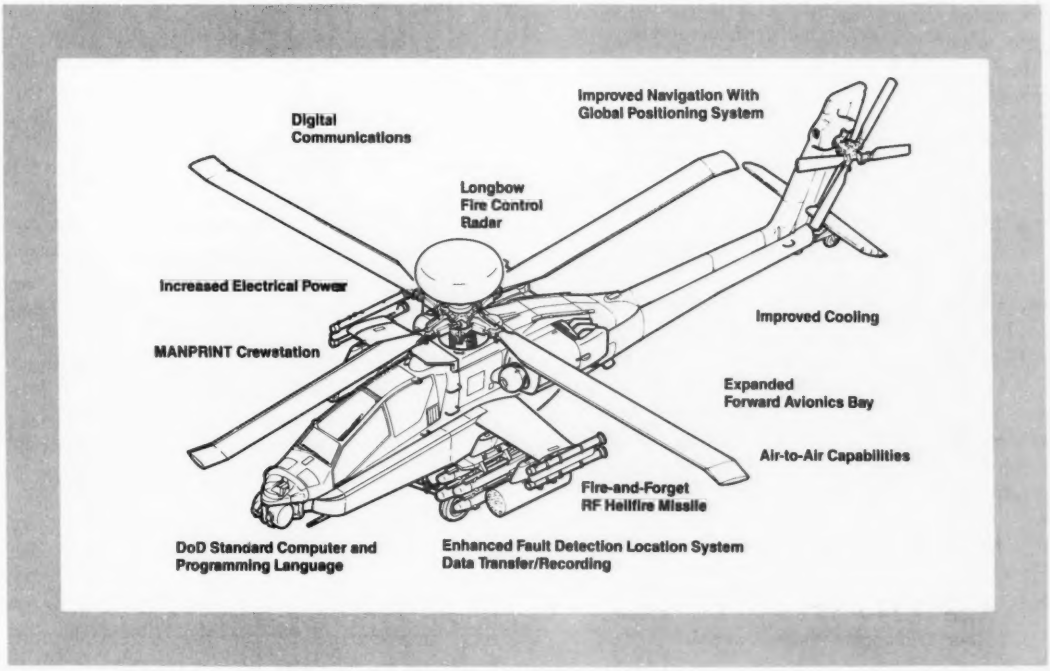
The crew can load fire control measures into the DTM by geographic location in a point file. This allows the crew to slew the target acquisition and designation system (TADS) to the predetermined geographic location. It ensures the FCR scan does not overlap the location through simultaneous sensor operation.

The DTM can be loaded with different priority tables for the FCRs within a team. The DTM then provides the commander a means to control which team engages which targets. The crew can radar sweep an area and call up the geographic location of any target. He can then compare the information with control measures in the fire control plan or known friendly unit locations.

Before the attack unit departs for the battle position (BP), it is important to plan for the engagement. Once the approximate size of the engagement area (EA) and the distance from the BPs to the EA is known, one can determine the necessary separation between the teams and the azimuths of their fire control radar scans. With this information, the commander should decide tentative locations for each team within a battle position.

**Engagement**

One of the Longbow aircraft, usually the company commander's, must be the primary fire control point for Longbow attack units. He controls the fires of the Longbow attack aircraft in his company and directs them into the appropriate sector of fire. As with any weapon system, he



should avoid certain sectors of fire to provide for the safety of friendly forces.

The sequence of events that an attack helicopter battalion (ATKHB) uses to engage an enemy force will not change with the introduction of Longbow. The proper sequence is as follows:

- Move to a holding area.
- Coordinate between attack and aeroscout if in use.
- Move to BP and select firing positions.
- Acquire and engage targets.
- Move to subsequent BP or forward arming and refueling point (FARP), or return to the holding area.

Since current aeroscout helicopters fielded in Apache battalions lack electro-optical (EO) sensors, the Longbow Apache may be forced to fight alone in their BPs at night and under reduced weather conditions. Aeroscout helicopters will not be a part of these engagements at the BP because of their inability to acquire and distribute targets rapidly. The aeroscout may still be used for such things as passage of lines, security of forward assembly areas, or checking FARPs.

When the aircraft arrive at the BPs, they should take up their team positions as planned unless adjusted by the mission commander. This is so the maximum area possible will be covered by FCR scans and as much information is gained as possible. However, the teams must maintain communication with one another. The commander can then confirm pre-planned zones of fire to each aircraft.

Fire control measures will remain the same as for the AH-64A except for target distribution between aircraft. This target distribution is complicated because each Longbow aircraft may classify and prioritize the same targets. The crew may, however, prioritize their FCR on different classes of targets. As a result, distributing targets by classification may be performed with reasonable accuracy. Multiple kills on the same target are a distinct possibility if fires are not closely controlled.

In a BP, the commander employs the Longbow attack helicopters in teams of at least two (lead-wingman). This is to ensure mutual security in the BP. Each aircraft in the team should be operating with its FCR prioritized in a different mode; i.e., ground, air, moving or stationary.

When the commander directs, each team's lead Longbow aircraft unmasks its FCR to conduct a scan of the EA. If no targets are detected, the leads will remask and prepare to unmask and scan again. The aircraft should not unmask more than twice from the same position. As the lead scans for ground targets, the wingman should conduct air scans for security.

If high-priority targets are detected, the Longbow aircraft will engage immediately, able to fire several RF HELLFIRE missiles in sequence at different targets. The crew limits the number of missiles it fires to ensure it has time to remask inside the firing time lines of the threat air defense (AD). If more than a few high-priority targets are detected, the aircraft fires at the first aircraft and then remasks. It hands over cueing information on the others to the commander to be processed and given as target handovers to other attack aircraft.

If other than high-priority targets are detected during the FCR scan, the attack aircraft then remasks for target handover to the commander. The commander processes the targets for distribution and handover to all attack aircraft teams in the unit.

After receiving their target handover, each attack aircraft team will autonomously engage their targets. One aircraft a team fires at a time. This precludes several aircraft from engaging the same target. If any team aircraft cannot engage its assigned targets because of terrain shadowing, it will immediately pass them back to the commander to be given to another aircraft.

During successive engagements into the same EA, only moving targets or active AD emitters should be fired at to prevent wasting missiles on dead targets. If all targets stop moving, the attack teams should call for artillery, if available and within range, or fire their rockets to cause enemy movement and ensure maximum destruction. The attack teams may be able to verify that a particular target is not dead by visual confirmation with the

**If high-priority targets are detected, the Longbow aircraft will engage immediately, able to fire several RF HELLFIRE missiles in sequence at different targets.**

TADS. The crews can then use the FCR and detect, classify and engage with RF missiles again. When using TADS with the FCR, the EO sensor can point the FCR in the desired location after identifying the target visually or slew the TADS to an FCR target for identification.

Alternatively, the Longbow FCR can acquire targets and the EO sensors can identify them before engagement. This allows effective use of the RF fire-and-forget missile or, when there is adequate visibility, the semiactive laser (SAL) missile.

Longbow helicopters tasked to escort AH-64As to and from the EA would increase the survivability of the strike by providing air defense artillery and air threat overwatch and protection. Longbow is ideally suited to enhance the combined arms team's capability by attacking targets in deep operations. In this operations area, Longbow can be employed to its fullest extent against ground vehicles with no restrictive fire control measures.

Within the deep operations area between the forward line of own troops (FLOT) and the fire support coordination line (FSCL), the fire control measures the commander takes depend on how far forward other friendly forces are operating. The tactics that should be used in this area are generally common to those that will be discussed later.

**Air Engagements**

One of the priorities for the threat helicopters is to destroy U.S. antiarmor systems in the air and on the ground. Keeping in mind that the Apaches must get home safely, the Longbow aircraft should reserve 10 percent of their ammunition for the return flight to friendly lines. At any time or at any location on the battlefield, Longbow attack helicopters are liable to encounter threat aircraft. For self-security, the attack force operates with some aircraft providing air security, while the others operate in the appropriate mission mode.

Longbow is capable of dealing with enemy helicopters that pose an immediate threat to mission accomplishment. Using the information gained from the FCR, the attack unit is capable of the following actions:

- Avoiding detection by knowing where the enemy air systems are located.
- Seeing the threat at long standoff ranges before the threat sees it.
- Engaging the threat with air-to-air missiles, RF missiles, or other weapons, before the enemy gets off the first shot.

Also, with the commander's knowledge of what friendly aircraft are operating in the area and where they are, Apache Longbow is able to locate the threat from the FCR display. Attack units will safely fire first and then deploy to cover or continue the primary mission. Firing in this manner allows the attack aircraft to conduct multiple engagements of enemy aircraft in a short period of time.

**Intelligence Gathering**

To gain maximum benefit from the Longbow Apache's FCR, the commander must use the vast amounts of information the FCR makes available. This information can be shared directly from the pilot as he sees it or it can be obtained from the DTM after the mission is over.

Longbow can perform many scout tasks during periods of low visibility or visual obscuration when other helicopters' sensors are inoperable. The commander could task crews to screen FCR data and provide early warning information. Looking out to its maximum range, the FCR could provide the commander with location and strength information on the enemy force long before it closes with our own forces. The FCR also is of great value in locating enemy air assault or attack forces en route to their objectives.

The DTM retains and brings back valuable information from deep attack missions. This includes location of forces, array of forces, speeds and directions that these forces are moving. The commander can use this information in determining the effectiveness of the attack mission, the results that the mission had on the enemy's capabilities and the enemy's intentions.

**Deep Operations**

In deep operations, the FLOT is defined initially by the foremost elements of the covering force. Within the deep operations area, but forward of the FSCL, little chance of having friendly forces combined with those of the enemy exists. However, special care should be taken to be aware of the location and activity of any long-range reconnaissance patrols that may be operating in this area. Normally, there will be no need for positive visual identification of ground targets this far forward since the chance of fratricide is almost nonexistent. Crews can fire Longbow's RF missiles freely at

**To gain maximum benefit from the Longbow Apache's FCR, the commander must use the vast amounts of information the FCR makes available.**

ground targets. Since several friendly units may be operating in the deep operations area, a good IPB and operations order are necessary.

In a deep strike mission, an ATKHB is much more survivable with the Longbow Apache's FCR providing overwatch and early warning while en route for the formation. Two lead Longbow Apaches can operate their FCRs continuously—one in the ground mode and one in the air mode. The Longbow formation flies contour or low-level flight, engaging AD and air threats, or circumnavigating concentrations of threat AD and counterair to arrive at the EA. Longbow Apache helicopters will engage only the enemy AD that poses a threat to the mission en route to the EA.

**Close Operations**

The close operations area is the place where the majority of our armored vehicles fight the enemy. The most likely use of Longbow attack units is to attack before the enemy has closed with our ground forces. The ATKHB then moves to attack followon or second echelon units that now are in the deep area. The Longbow units should fire into different EAs than the armored units to best use the fires of the total combined arms team.

The FCR will allow attack helicopter unit commanders to quickly and more accurately pinpoint the location of vehicles. Once ground forces are located and positive communication with the ground forces commander has been established, the attack unit can orient on the enemy force for the attack. In the close operations area of the battlefield, where the helicopter is vulnerable to the large number of threat systems, the fire-and-forget missiles will enable attack aircraft to be unmasked for a minimum amount of time. This greatly enhances the aircraft's survivability.

Once opposing forces become mixed with our ground forces, identification, friend or foe (IFF) is a problem for the FCR. When Longbow Apaches must engage targets within 1,500 meters of friendly forces, the missile fired should probably be the SAL HELLFIRE. The SAL HELLFIRE can be designated to hit specific targets when it may be inappropriate to fire a fire-and-forget missile. When positive IFF can be determined by the aircrew and the friendly forces are avoided by more than 1,500 meters, Longbow can be used effectively and decisively.

The global positioning system (GPS) will communicate more precise information about locations between the ground force and the Longbow attack force. The Longbow Apache will have the GPS and eventually many of the ground force vehicles will also. This will help to clear up possible confusion about locations of friendly and enemy forces are located and further reduce the chances of fratricide.

**Rear Operations**

In the rear operations area almost anything could be encountered. The threat could be a level-1 raid into a supply area in which Longbow targeting would be of limited value because of the chaotic situation and intermingling that would be present. Longbow would probably not be used in a situation like this as an attack force, but its FCR could be used to develop situational awareness.

On the other extreme, the threat could be a breakthrough element of heavily armored combat vehicles in an area isolated from friendly forces. In this situation, a Longbow unit could be used at its fullest potential and rapidly strike at an armor formation.

The appropriate rear operations area commander would analyze the situation between these two extremes. Longbow could be used, as necessary, when in positive communication with a ground forces commander.

As with close operations, the GPS will help the Longbow attack force to distinguish between friendly and enemy forces by pinpointing their location. This will allow more accurate Longbow attacks when currently too many factors are unknown about enemy locations.

**Conclusion**

In conclusion, Longbow Apache is an evolutionary step forward for attack helicopters. It has fire-and-forget HELLFIRE missiles and an ability to see more of the battlefield during obscured conditions. These capabilities will allow it not only to kill more, but to survive better. Longbow Apache employment also will greatly benefit all commanders because of its capability in gathering intelligence on hard to find targets. As the U.S. Army progresses into the 21st century, Longbow Apache will provide firepower and mobility needed for AirLand Battle-Future.

# ARMED OH-58D KIOWA WARRIOR

## THE MULTIPURPOSE LIGHT HELICOPTER

**Colonel James T. Huey**
Project Manager, Armed Helicopter
Improvement Program, St. Louis, MO

WITH THE POLITICAL environment in Europe changing, the debate over how to spend already scarce resources is likely to continue. Recently, this debate has focused on the U.S. Army's mission—particularly the appropriateness of a perceived orientation toward a set piece battle in Europe at the expense of worldwide contingency operations.

For the past several years, the leadership of those organizations tasked to plan and conduct Army contingency operations has sought to ensure that enough resources are applied to modernize the equipment used in such operations. To that end the Army developed an Operational Needs Statement (ONS) in 1988. The ONS defines the requirements for a multipurpose light helicopter (MPLH) for use in contingency operations. It was used to obtain the resources necessary for procurement.

Figure 1 lists some major ONS requirements. The term MPLH is derived from the observation that one aircraft, which could meet all these requirements, is truly multipurpose—

- An armed aircraft.
- A troop transport aircraft.
- A litter-carrying, medical evacuation aircraft.
- An aircraft capable of external cargo operations.

**OPERATIONAL REQUIREMENTS**

- Out-Of-Ground Effect (OGE) hover at 4,000 feet pressure altitude, 95 degrees Fahrenheit (F)
- Capability for air-to-air Stinger (ATAS), .50-caliber machinegun, HELLFIRE, and 2.75-inch rockets
- 2,000 pound cargo hook
- Transport six combat troops
- Medical evacuation capability
- Night vision goggles compatible cockpit
- Worldwide navigation system
- Communication within military spectrum
- AN/APR-39 radar warning receiver
- Perform mission with a crew of two
- Combined mission radius of at least 100 kilometers

**PHYSICAL REQUIREMENTS**

- C-130 air transportable, two to three at a time with weapons mounted, capable of offload on dirt strip within 15 minutes day or night (10 minutes desired)

**LOGISTICAL REQUIREMENTS**

- Operate 2 hours at 4,000 feet, 95 degrees F
- Must be assembled and deployed without accompanying test equipment
- Capable of being armed either during flight or on C-130 tailgate

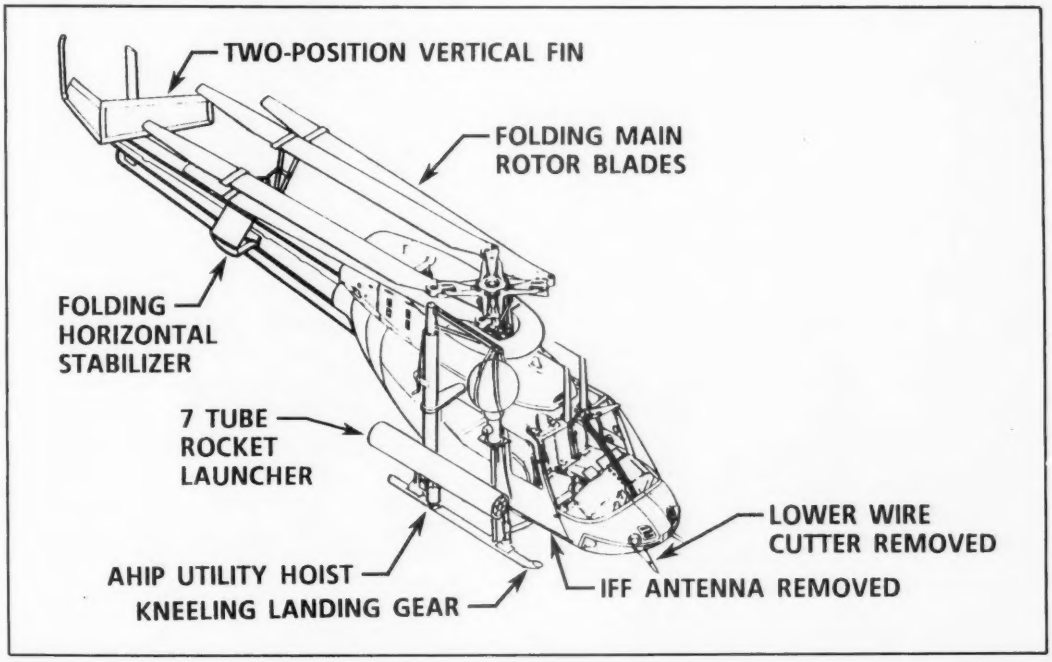
**FIGURE 1: Some of the major requirements of the operational needs statement.**

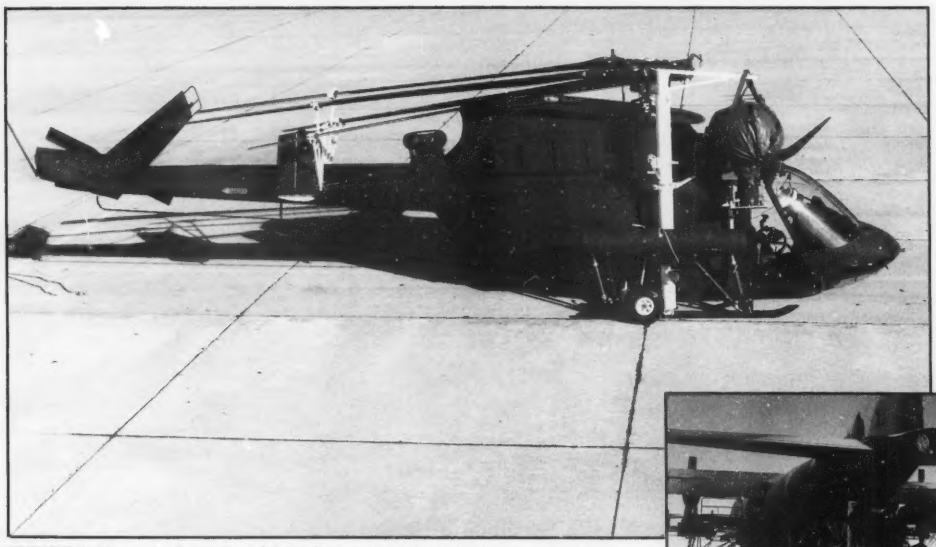
All of these elements are combined in one light helicopter that can be rapidly deployed worldwide (figure 2).

Headquarters, Department of the Army (HQDA), and the Program Executive Office (PEO), Aviation, compared the requirements of the ONS with the capabilities of existing aircraft. They had to determine if any aircraft already fielded could meet these requirements. Examination of the capabilities of existing aircraft is a necessary first step in the materiel acquisition process.

The selection of an existing aircraft to perform the MPLH mission would have the dual benefit

**FIGURE 2: Rapid deployment kit for the armed OH-58D.**





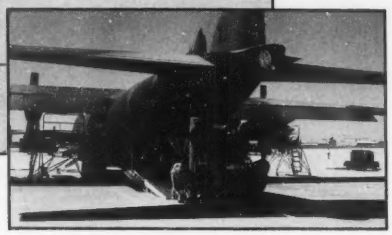


**FIGURE 3 (above): Actual rapid deployment kit installed on an armed OH-58D.**

**FIGURE 4 (right): Offloading a single armed OH-58D from a C-130.**

of reduced (or no) development costs and fewer logistics impacts.

The logistics benefits of a fielded system include the following:

- The cost avoidance of initial spares and training.
- The less tangible benefit of not adding another aircraft to a maintenance and supply system nearly overloaded with single purpose (mission) aircraft.

The armed OH-58D Warrior was an obvious candidate for the MPLH role. As the Army's first true aeroscout, it has proven itself at the National Training Center, Ft. Irwin, CA, and in Europe during Return of Forces to Germany (REFORGER) exercises. The armed OH-58D has also proven itself in the field artillery aerial observation role. It showed its potential in close air support operations through several successful demonstrations with modified F-16 Fighting Falcons. But, most importantly, it has proven itself in combat in the Persian Gulf during Operation Prime Chance.

There was significant concern that the armed OH-58D might not be able to meet the rapid deployment requirements of the ONS, particularly at night. Bell Helicopter Textron, Inc. (BHTI) demonstrated the rapid deployment potential of the armed OH-58D earlier (September 1988). BHTI had developed a specially designed kit for this demonstration (figure 3). They were able to offload a single armed OH-58D from a C-130 Hercules on the ramp at the Dallas Naval Air Station, TX, during daylight within 6 minutes.

The stopwatch was started at C-130 ramp down; then the armed OH-58D was offloaded (figure 4) and reassembled and, finally, the stopwatch was stopped at the time of the OH-58D's takeoff. The remaining task was to demonstrate a night deployment of two armed OH-58Ds; offloaded from a C-130, onto a dirt strip; reassembled using Army personnel; and in the air, mission-ready, within the 15 minutes (10 desired) required by the ONS.

To accomplish that task, the U.S. Army Helicopter Improve-

ment Program (AHIP) project manager and Task Force (TF) 118 of the XVIII Airborne Corps, Ft. Bragg, NC, conducted a demonstration. Several planning sessions in January 1989 led to the development of a realistic scenario. The scenario required that a C-130 land at Sicily Drop Zone at Fort Bragg, at night, with two armed OH-58D aircraft on board.

BHTI developed two prototype rapid deployment kits. The installed kits allow—

- The vertical fin to rotate.
- The horizontal stabilizers to fold.
- The fuselage to be lowered (after removal of the ultra high frequency antenna and the lower wire cutter), using jacks mounted to rapid deployment skids.
- The hinged armament pylon arms to fold inward (closer to the fuselage).

The kits also contain—

- A hoist for rapid installation or removal of the mast mounted sight (MMS).
- A mount for securing the MMS to a skid.
- An airborne heading reference system (AHRS) rapid warmup system.

The AHRS warmup system allows a second aircraft battery to maintain the power to the AHRS, thereby allowing the AHRS to continue its alignment process during engine start. Without the warmup system, alignment could not begin until after engine start. The AHRS would not be aligned when the aircraft was ready for takeoff.

BHTI also developed prototype troop seats. The seats would allow six troops (three per side) to sit externally along the fuselage on both sides of the aircraft (figure 5).

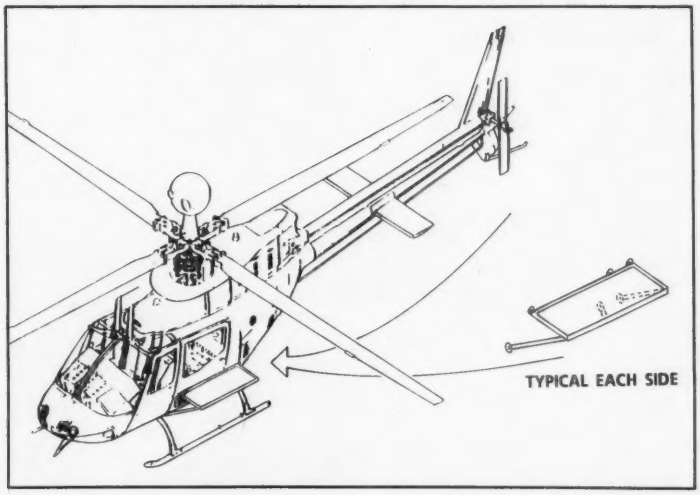
BHTI loaned both prototype kits to TF 118 to equip two demonstration aircraft. One aircraft was armed with an M-260 rocket pod and a .50-caliber machinegun. The second aircraft (unarmed, no weapons pylons or mast-mounted sight) was configured with troop seats.

The U.S. Army Aviation Systems Command, Directorate for Engineering, St. Louis, MO, provided airworthiness releases for the duration of the rehearsals and flight demonstration for both OH-58D aircraft at 5,200 pounds and 100 knots.

The release for the armed aircraft approved the modification for the AHRS warmup system and weapons firing (.50-caliber and 2.75-inch rockets). It was later revised to allow Stinger and HELLFIRE missile firings.

U.S. Air Force (USAF) regulations required a transportability certification for the armed OH-58D before flight on the C-130. As part of the certification process, a test loading was conducted at Pope Air Force Base (AFB), NC, on 10 February 1989 with representatives from the USAF Military Airlift Center, Pope AFB; USAF Military Airlift Command, Scott AFB, IL; and the USAF Aeronautical Systems Division, Wright-Patterson AFB,

**FIGURE 5: Troop seat-cargo platform kit for the armed OH-58D.**



Dayton, OH. The test loading was successful and an air transportability certification in C-130 Hercules and C-141 Starlifter aircraft was provided for armed OH-58D aircraft configured with rapid deployment kits.

TF 118 conducted several rehearsals at various locations on Ft. Bragg, both day and night during the 3-week period preceeding the demonstration. Representatives from the U.S. Army Training and Doctrine Command, System Manager-Scout and the U.S. Army Aviation Center, Ft. Rucker, AL, documented the training to include development of task lists for each crewmember. The optimum number of crewmembers for speed and efficiency was determined to be four. Only tools found in the standard toolbox were allowed.

The demonstration took place on 2 March 1989 at 1930 hours (about 30-percent illumination). The crews used chemical light sticks. Observers needed night vision devices to view the demonstration. The second (unarmed) aircraft to emerge from the C-130 was ready for takeoff in 7 minutes and 30 seconds.

It delayed its departure waiting for the other aircraft. The first (armed) aircraft to rolloff the C-130 took off with the second aircraft at 10 minutes and 40 seconds after C-130 ramp down. After a flight to demonstrate their airworthiness, both aircraft were reloaded into the C-130. Reloading took about 22 minutes.

Practice has shown that both aircraft can be airborne in as little as 8 minutes. The time required depends on variables such as level of darkness, soil conditions, use of power tools and crew training.

The actual demonstration took longer because of—

- Wet soil.
- Only table of organization and equipment handtools used.

**FIGURE 6: Armed OH-58D firing (2.75-inch rockets).**

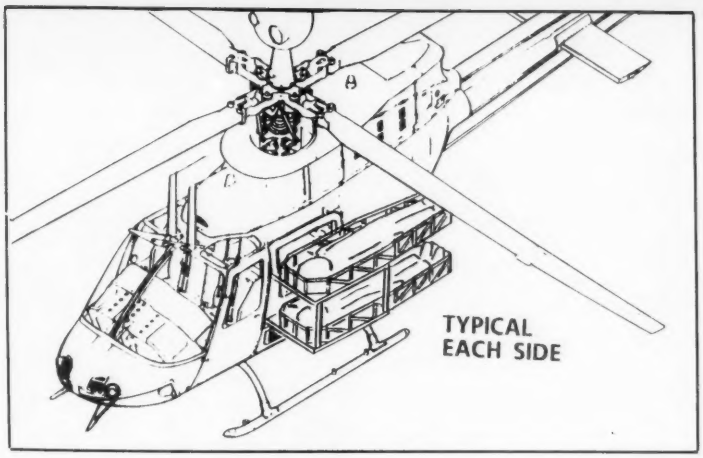



FIGURE 7: Litter kit for the armed OH-58D.

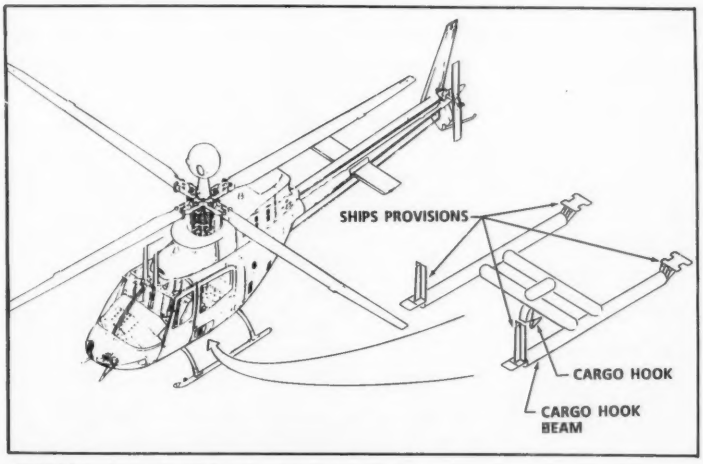



FIGURE 8: Cargo hook for the armed OH-58D.

- Use of an untrained loadmaster. (One loadmaster had practiced with the Army crews but was unavailable for the demonstration because he had broken his toe in an unrelated incident.)
- A problem with one of the prototype jacks.

The enthusiasm and professionalism of everyone, particularly the Army crews from TF 118, contributed immeasurably to the success of the demonstration.

Range and time constraints prevented verification of the aircraft's ability to fire its weapons as part of the demonstration. However, TF 118 kept the rapid deployment kit on one of the aircraft. The rapid deployment-configured OH-58D successfully fired Hydra 70 rockets and the .50-caliber machinegun on 15 March 1989 (figure 6) and Stinger and HELLFIRE missiles on 20 April 1989.

Secretary of the Army, the Honorable Mr. Michael P. W. Stone, chaired the HQDA-level review of the armed OH-58D and the MPLH provisions on 6 December 1989. As a result, he approved the OH-58D as the MPLH. He decided that all OH-58D aircraft planned for production (243 total) will be armed and at least 81 aircraft will have MPLH kits installed. Mr. Stone signed the memorandum formalizing these decisions on 8 January 1990 and sent it to the Aviation PEO.

Efforts are currently underway to initiate the armed and MPLH programs and to incorporate MPLH provisions on the aircraft in production. Figure 7 shows preliminary design of the litters. The lower litters should fit on the troop seats and the upper litters will attach to a platform mounted to upper hard points on the fuselage. Troop seats will be designed for securing small cube cargo (no heavier than the troops). BHTI already has a commercial cargo hook for the model 206 Jet Ranger, which can be installed on the OH-58D. Figure 8 shows preliminary design of the cargo hook. Crew emergency cargo release methodology and design have not been completed.

The President's budget provides funding to test and fully qualify the armed OH-58D and the MPLH configuration. The first MPLH configured aircraft will be fielded in fiscal year 1992. The MPLH is on the way!

***These fresh and often rediscovered ideas will enable the Apache and its cosmic electronics to kill like a champion on the next battlefield. Good head work within the cockpit produces. . .***

# . . .Good Hunting

**Captain(P) D. Mark Ferrell**
Apache Combat Developments Officer
U.S. Army Aviation Center
Fort Rucker, AL

THIS ARTICLE TELLS how-to-fight in a low-intensity conflict (LIC), low-to-mid threat, from the AH-64 Apache's cockpit point of view. Army doctrine defines a LIC as the following: a political-military confrontation between contending states or groups below conventional war and above the routine peaceful competition among states.

Our definition has this meaning: we have been waiting to slam HELLFIRE missiles into a guard's tank division; however, the division will probably not show for this fight. This does not mean the Apache is out of a job in a LIC. Guns and rockets have never been out of style in a LIC, and the Apache has the means to employ these weapons.

We will look at the *switchology*, *organization*, *formations* and *procedures* to employ the Apache, day or night, in the LIC. I have drawn information from numerous publications, doctrinal white papers, unit standing operating procedures, personal flying experiences and other services. The Department of Tactics and Simulation, Ft. Rucker, AL, has a white paper on running and diving fire that was the primer for this article. If you have not read it, you may write for a copy.

My greatest source of information about attack helicopters in a LIC comes from what I call the "father-to-son" school of tactics. More than 10 years ago, I was fortunate to have an attack helicopter company assignment with an abundance of combat-hardened veterans. From them I learned the art form of running and diving fire. Their lessons are as correct today as they were in the skies of Vietnam. I am indebted to their mentorship.

To prove the worth of every profile discussed in this article, I have flown the profiles numerous times in an Apache. Each flight produced a kneeboard pad full of information and also exposed things that did not work.

## *Switchology*

An Apache is no good to anyone if the switches are not in the right place when it's time to shoot. In this article, the pilot primarily uses the rockets; the copilot gunner (CPG), the 30mm cannon. The rockets are Hydra 70s with 10-pound, high-explosive, remote, fused warheads. The cannon will fire the standard 30mm high explosive, dual-purpose round.

Using the aerial rocket control subsystem, the pilot will select the type of rockets to use; for example, 6RC. With remote fusing, the pilot can select the height of burst detonation

from bunker penetration (3 meters thick) through superquick (first contact). If the target is within a tree canopy, the pilot can enter the tree height to enable the rocket to penetrate the canopy's foliage, or building roof, to detonate at an effective point.

After setting the quantity of rockets to fire, the pilot should also set the range to manual or automatic. A manual range of 3 kilometers (kms) works well en route as a battlesight; otherwise the pilot uses laser-ranging against a known target. The pilot can use automatic range calculations, based on the pilot's line of sight (LOS) and radar altitude. However, the pylons take a beating because of constant changing variables. With either ranging option, the pilot's sight is the helmet mounted display (HMD) with a broken I-beam steering cursor.

The CPG has some options on how to set up the cockpit, such as placing switches in various settings. My preference is to use the sight select target acquisition designation system (TADS) and acquisition select gunner's helmet sight. This allows the TADS to follow my head, but I have the option of slaving the TADS if I sight a target. This allows for a stabilized sight from which to change fields of view and engage the target. If the pilot sights a target, the CPG's HMD's symbology will cue the CPG to the target, or he can acquisition select the pilot's helmet sight.

Be cautious if you use the sight select HMD/TADS, because the CPG's HMD will be active sight. If you use the head down display in the optical relay tube with this switch setting, the gun will still follow the HMD. The TADS might be looking at the target, but the rounds will be going where your head and HMD are pointed—straight down!

Last, but not least, don't forget to "push-them-up." Place the arming switch to armed. The two types of attack aviators are those who have forgotten to arm their weapons before pulling the trigger and those who will forget. What is comical on the range can be deadly in combat. Train (no ordnance onboard) to fly with the arming switch to armed. Flying with switches "hot" while safeguarding the triggers will become automatic. Do not forget the video recorder—it is hard to be a hero without proof.

## *Organization and Formations*

For maximum flexibility, the lead-wingman team provides the best organization for employment in a LIC. Use of the lead-wingman team enables proper lookout techniques, aggressive maneuvering, rapid weapons employment and good mutual support. Despite the size of the organization, the team is the basis for all maneuvers.

Two basic tactical formations specifically are designed for the lead-wingman team: combat cruise and combat spread. Users can find

both of these formations in Field Manual (FM) 1-107, *Air Combat Operations.*

While primarily directed toward an air threat, these two formations are ideally suited for control of immediate team maneuvering. Basic air combat maneuvers are described in FM 1-107. These maneuvers are the "battle drills" from which one can quickly bring guns-to-bear onto a ground threat when flying in a combat cruise or spread.

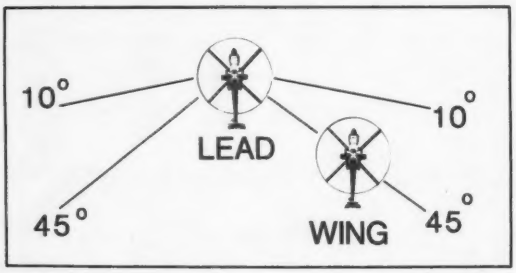



**FIGURE 1: Combat Cruise**

**Combat cruise** (figure 1). The wingman must position himself to best visually cover the lead aircraft. He must be prepared to employ the weapons to support the leader. Combat cruise is the likely night formation with the wingman flying off the lead's right side.

RULE: *Avoid flying the trail position!* When the lead and wing both fly the same ground track, these conditions exist: observation as a team is reduced; fire can be placed on the entire team without adjustment; and the enemy is alerted by the lead aircraft, in which case the enemy takes cover or fires on the wingman. Ducks won't fly in trail; neither should we.

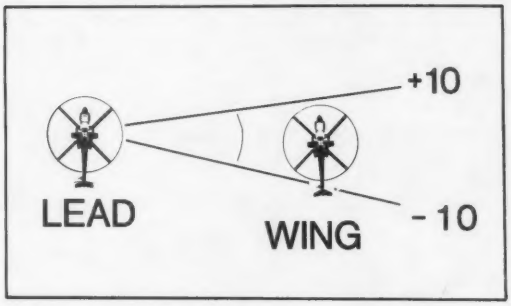



**FIGURE 2: Combat Spread**

**Combat spread** (figure 2). This formation provides especially good lookout for the team. Do not forget to check each other's 6 o'clock position. Several third world countries have acquired a respectable number of attack helicopters. Conflict may be low-intensity, but it can rapidly become high threat once tracers from a HIND-D (Soviet Mi-24 attack helicopter) go flashing past your canopy!

RULE: *First to sight wins the fight!* The team must effectively scan the horizon and the surrounding terrain. Within the team, overlapping coverage among aircraft is a must. If an aircraft takes fire, the other team member has to see it happen to provide suppressive fires quickly. Each crewmember must be assigned a specific area of lookout responsibility. At no time should both crewmembers look in the same direction. Sore necks, after flying a mission, are an indication of good lookout techniques.

## *Attack Methods*

Finding, fixing and then piling on is the name of the game in a LIC. Two attack

methods the Apache can use, each with its own particular weapons employment techniques, are as follows:

*Diving fire.* To employ diving fire, the enemy must be armed only with small arms, nothing greater than light machineguns. If the enemy has a man-packed missile, diving fire becomes an unhealthy option. However, the higher altitudes used with diving fire will provide greater standoff from small arms. Altitudes will vary with the situation; against a target with nothing greater than a light machinegun, a beginning altitude of 3,000 feet is a good start.

The team can use an initial point (IP) or establish an orbit over the target. Using an IP, the lead should be at the beginning altitude with the wingman in combat cruise of 200 to 500 feet above the leader. Wing must position himself with enough separation to be in the dive and ready to fire as the leader pulls off from the target. The orbit, sometimes called a racetrack, can have the lead and wing 180 degrees out from each other, again with 200 to 500 feet vertical separation.

Before beginning the dive, the CPG will acquire the target with the TADS to cue the pilot to the target. Since the pilot will fire rockets from a dive, no laser ranging is necessary for the rockets. Enter the dive at 100 knots. At this airspeed, the pylons will be in flight stow and remain so during the dive. The pilot will have a broken I-beam for a rocket steering cursor in the HMD.

Starting at 3,000 feet, 100 knots and with a 15-degree dive angle, the pilot will have about 10 seconds to conduct the attack. During this 10 seconds, the pilot must acquire the target; align the rocket steering cursor with cueing from the CPG's TADS; maintain constant torque; keep the aircraft in trim; employ flares; and fire the rockets. At the end of this 10 seconds, the aircraft will be at 150 knots and passing through 1,800 feet as the pilot begins a 2- to 2.5-G (gravity) pullout.

During the pullout, the CPG engages with the gun. Do not forget to employ flares. The intelligence officer said there was no missile threat, but would rather tell him in person that he was wrong than to have my wing telling him about the one that flew up my exhaust.

The wingman should be in the dive as lead pulls off the target to cover him. The wingman must be a trusting individual with a good sense of timing. Lead climbs out to the beginning altitude, watches the wingman to cover him and prepares for a reattack.

RULE: *Avoid overflight of the target!* Shooting up bad guys will tend to make them want to shoot at you. Do not help the enemy's firing solution by flying over the top of them. Disengage before you enter into the "deadman zone." The deadman zone is the range of the threat's weapon systems that can bring you down. If the situation forces you to enter into the zone, pass through quickly. In this case, speed is life.

If a steep dive angle of 30 degrees is used, engagement times will decrease. Beginning at 3,000 feet and 50 knots, the pilot will have only 7 seconds before passing through 140 knots and 1,500 feet. The pilot can use a steep dive when firing against a target located in an open area surrounded by tall trees or buildings. A steep dive is a quick-shot.

*Running fire.* Running fire is an effective method when the team flies in the terrain flight mode. It offers a good mix of weapons accuracy and aircraft survivability. Running

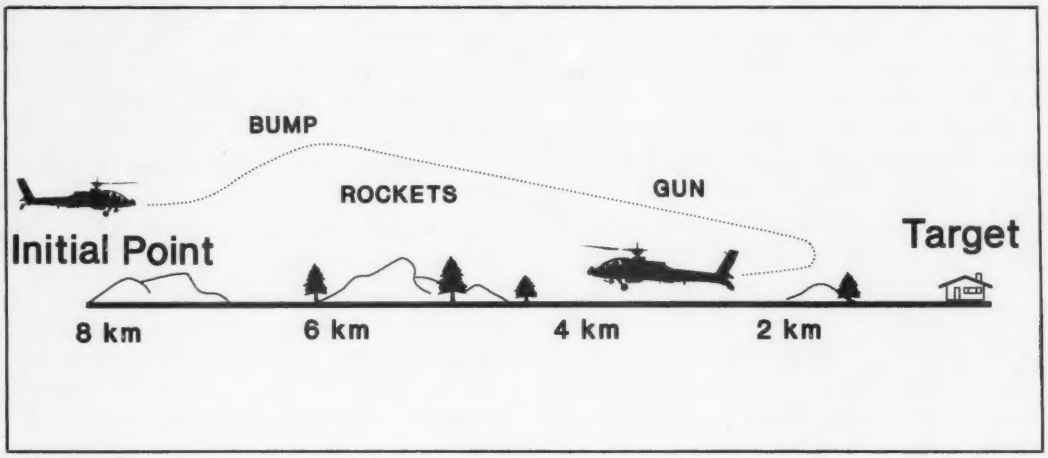



**FIGURE 3: Running Fire**

fire is used when the team fights an enemy armed with man-packed missiles. This is a LIC with a mid-level threat. In addition, running fire is used when fighting in a sandy and dusty environment. In the desert, the last thing you need is a 300-foot dust signature while the helicopter hovers.

A few years ago, some AH-1 Cobra units started to use "high-energy tactics" to keep alive; in other words, running fire. This occurred after a couple of Operation Bright Stars and trips to the National Training Center, Ft. Irwin, CA. We Apache pilots should not forget this when our LIC just happens also to include tanks, missiles and lots of sand.

Additional switchology for running fire begins with the CPG entering a grid location for the target into the fire control computer (FCC) and Doppler. This gives the aircraft a rapid pre-point to the target, using the TADS, steering information and range read down for the pilot. The CPG lases for range information, but still the pilot should enter a manual range of 4 to 5 kms as a backup into the aerial rocket control system.

The pilot uses a cooperative rocket engagement when the CPG acquires the target with the TADS and when the pilot aligns the rocket steering cursor over the TADS LOS. The pylons articulate in elevation below an airspeed of 100 knots. It's a good idea to verify this in advance. Other than these additions, switchology remains the same as in diving fire.

An IP located about 8 kms from the target is the starting point for a running fire attack (figure 3). The IP should be a terrain feature recognizable either day or night. Before departing the IP, the CPG pre-points the TADS to the target and selects the Doppler entry for the target. At the IP, the team enters into a low orbit, 180 degrees out from each other, masked from the target for security.

The lead departs the IP at 80 knots flying contour toward the target. At 6 kms, the pilot

performs a "bump" to gain intervisibly with the target. This bump is nothing more than a gradual climb that allows the CPG to sight the target with the TADS. Once the CPG has the target, the pilot stops the bump and stabilizes the airspeed at 80 knots.

During the day, the CPG can use direct view optics (DVO), then switch to day television (DTV) for cooperative fire or use DTV throughout. Going heads-down for the DVO can be uncomfortable, but may be required if the target is identifiable by color. It's "shoot the guys by the red truck" target description that makes the DVO worth keeping.

At about 5 to 5.5 kms, the pilot aligns the rocket steering cursor with the CPG's TADS LOS and begins engagement. Since the airspeed is 80 knots, the pylons articulate and the pilot uses laser ranging. A 3- to 5-degree dive angle is about all that is required. At 3.5 kms, the rocket engagement ends and the aircraft is accelerated to 120 knots for a follow-up gun shot and turn-off away from the target.

During the acceleration, the pilot can re-mask the aircraft and bump up at 3 kms for the gun attack. At 2 kms, the pilot turns off and positions for a reattack or returns to the IP. Do not forget your chaff or flares as you turn away from the target. If you fire a HELLFIRE missile against a tank using running fire, move the IP back 2 kms and start the bump before passing 8 kms. Fire the missile and turn off before crossing 6 kms. I recommend you not press for a gun shot against this mid level-threat unless you really desire a Distinguished Flying Cross...and a Purple Heart!

illustration by Paul Fretts

The wingman once again positions himself to fire as the lead is coming off the target. The wing makes the run in from the IP in combat cruise or spread, depending on how the leader has briefed the attack. In running fire against a more lethal threat, the wingman can be given the role of "shooter" or "cover." As it implies, the cover has the wingman protecting the leader during the leader's attack. The wing does not engage the target unless the leader is threatened. Shooter is just that. The wing attacks the target with the leader.

Here is a trick when shooting the gun. Limit yourself to 10-round bursts with a second or two between them. Anything more can prevent the FCC and stabilization system from keeping up with the recoil-induced shaking of the aircraft.

## *Attack Patterns*

As a football team has plays to run, the Apache team uses basic patterns to plan for running and diving fire. In any particular situation, the team leader, like a coach, can use these attack patterns to begin control of the fight. These patterns are not set in stone. During fast-moving situations, the team leader must adjust them to the moment. These attack patterns are a starting point, a place from which the team leader establishes a sense of timing and control.

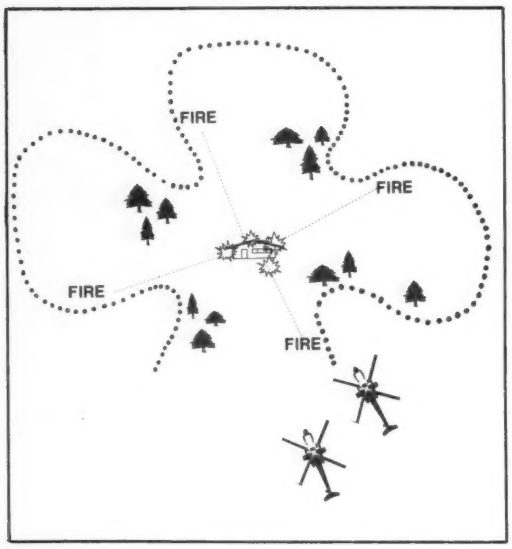



FIGURE 4: Cloverleaf

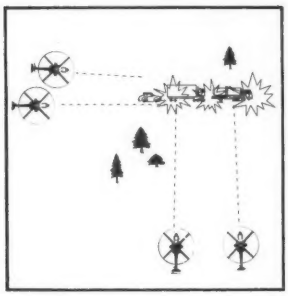


FIGURE 5: "L"

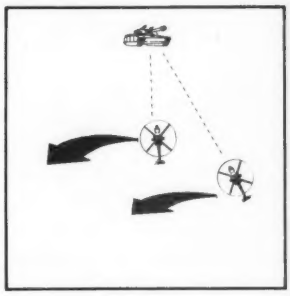


FIGURE 6: Inverted "V"

Various considerations help the leader select the attack pattern: the number of Apaches used; target characteristics; weapons capabilities (yours and theirs); friendly forces in the area; and the requirement for a change in direction for later reattacks.

Attack patterns are the cloverleaf, "L," inverted "V" and racetrack as follows:

*Cloverleaf.* The cloverleaf uses an IP with the team in combat cruise. This attack pattern is best employed against a point or small area target that the team can attack from any direction (figure 4).

The cloverleaf allows the team to place continuous fire on the target from several directions. Because the direction changes with each attack, the enemy cannot concentrate its fire in anticipation of later attacks. With correct lead-wing timing, the cloverlead enhances the mutual support within the team.

*L.* The L pattern also uses an IP(s), either with a single or dual team. With a "four shipper," each team employs the combat spread to have a large volume of fire within a short duration (figure 5).

The L is excellent against linear targets when the fires of one team crosses the other's, thus "Xing" the target. Teams can fire simultaneously or in phases, forcing the enemy to fight in two directions. Teams use the L pattern during swift, violent attacks.

*Inverted V.* The V is a disengagement pattern from the combat cruise when the team takes fire. As the lead engages with the gun and breaks away from the target, the wing can accurately fire rockets to cover (figure 6).

The V allows for maximum ordnance on target within a short period. The idea is to

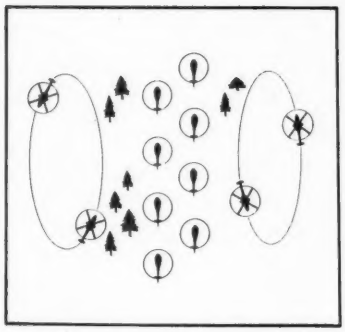


FIGURE 7: Racetrack

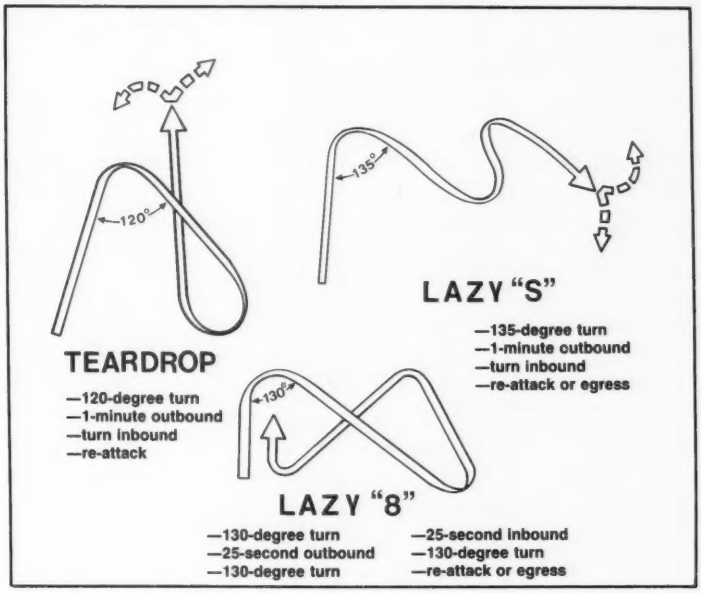



FIGURE 8: Reattacks

turn the table on anyone foolish enough to shoot at something that is out looking for trouble in the first place.

*Racetrack.* This pattern is particularly suited when the team needs to provide continuous fire. This method is also called the "elliptical" or "wagon wheel" (figure 7).

The racetrack ensures generally safe conditions for friendlies on the ground. This pattern is most adaptable during the pickup and landing zone phases of an air assault security mission, formerly called escort. The team must modify the pattern so the enemy cannot predict this type of attack. Do not forget the trail position rule.

## Reattacks

Three maneuvers work better for reattacks after the initial run at a target: teardrop, lazy "S" and lazy "8" (figure 8). They allow a safe egress from the target, as well as provide phasing between the leader and wingman or among teams when the teams conduct a four-ship attack.

Pilots should turn with no more than 60 degrees of bank to save energy. Teams use airspeeds of 100 to 120 knots, but drop below 100 knots before firing rockets. These reattack maneuvers greatly benefit the wingman. Instead of wondering what the leader will do next, a simple, "leads out right, reattack, teardrop" is enough said for the wingman who covers the lead.

## A Scenario

The situation for this scenario is an Apache team already at the IP. Both Apaches are loaded with 76 rockets and 1,200 rounds of

30mm each. A friendly infantry company contacts a larger enemy force attempting to surround it. The enemy has a man-packed missile capability. The time is late afternoon with good weather; the terrain is rolling hills with trees and open areas. The friendlies are along a tree line with 100 meters of open ground between them and the enemy.

Scout aircraft have conducted a hasty reconnaissance and secured the area. They have also selected an IP that allows the Apaches to attack with the sun to their backs. This IP also intersects terrain features and provides a ridgeline for masking once the Apaches have completed their attacks. The scouts brief the Apache team leader using a format similar to a joint air attack team format. The scouts establish communication between the Apaches and the ground commander. The scouts move to screen the area to prevent any other enemy forces to enter.

The scouts come from the on-station attack unit or an air cavalry squadron. Despite who they are, the scouts perform a critical role in the success of any mission. Just try doing all of this without them!

RULE: *Never fire until you know the friendly positions!* So often a team will arrive on station with its "fangs out and hair on fire," ready to hurt somebody. Do not allow impatience to hurry you into killing the good guys. If necessary, make a run at the target cold, a "recce" role, to verify the situation.

The ground commander will be using smoke to mark the position, both right and left boundaries. Since the smoke will be colored, the CPG will use the DVO to fix the position. At night, the commander can use strobe lights, flares or star clusters. The best possible marker the ground commander could use would be a laser designator to point out the target to the Apaches. If the scouts are OH-58D Kiowas, it becomes "an easy day at the office" as you pick up on their laser spots.

The Apache team leader has formulated the situation and selected running fire as the attack method and the racetrack as the attack pattern. He wants the wingman behind him and to his right side. Both lead and wing will use rockets to engage during this attack. The team leader briefs the wingman using the following format:

- "Running, racetrack"—Attack method and attack pattern.
- "Cruise right"—Formation.
- "Shooter, shooter"—Lead and wingman roles.
- "Rockets, rockets"—Lead and wingman weapons.

As the team calls, departing the IP, the ground commander replies, "Smoke Out." About the time that the lead Apache has conducted the bump, the smoke is up and visible. The leader makes a "visual on green smoke" call. The ground commander verifies that green smoke is his. If a laser designator is used, the attack lead uses the calls "laser on," "spot," and "terminate." The CPG acquires the target treeline by way of pre-point and direction from the friendly position. A "tallyho" call is made to inform everyone the team has sighted the target and the leader is attacking. As the CPG lases the target for range, he also designates the target for the wingman's laser tracker. The pilot chooses the amount of rockets to fire on each pass. The leader may put a pair out to confirm the target is the correct one early on during the first attack run. However, once the team finds the

target, it's time to beat up the bad guys. With 76 rockets onboard, firing 6 to 8 pairs per attack run will give 5 to 6 passes at the target. As the rockets impact, the ground commander should be passing corrections to you. This not only helps your aim, but your wingman's as well. In addition, the scouts can provide heading corrections from their screen position as the leader makes the initial run inbound on the target.

As the leader completes the rocket attack, he can select to press in with the gun. As the range drops below 2 kms, the leader terminates the attack. The wingman is already into the run, having sighted the target by either the lead's laser spot or impacting rockets. The leader calls "leads out left, reattack, teardrop" to his wingman.

The wing now knows what the leader is doing and can position himself for the next run as he comes off the target. Note that the leader said, "out left," not "breaking left." It's a small point, but aviators should use the word "break" only when taking fire, not as part of normal radio traffic.

> RULE: *Beware of target fixation!* Flight maneuvering close to the ground is risky business. Do not let an obsession to hit the target cause you to stop flying the aircraft. Let the CPG "padlock" the target, that is the purpose of the image auto track in the TADS.

During the reattacks, the leader has to adjust to the attack methods and patterns as necessary. Be sneaky; do not become predictable. Return to the IP once in a while so the ground commander can sort out the chaos. The leader must be thinking consistently about the next move, staying ahead of not only the team's aircraft but also the enemy's. This is what the fighter pilots call "situational awareness" and what my old teachers use to call "good head work."

The team remains on station, making repeated attacks until it destroys the target or is relieved by another team. Do not fire up all of your ammo, keep a little for self-protection for the trip back to the forward arming and refueling point. We won in this scenario, because our teamwork and tactics were established before the first shot was fired.

## *Conclusion*

I intentionally have avoided any discussion about the missions that an attack helicopter unit might conduct in a LIC. The debate over what we call close air support, deliberate attack or fire support can be fought elsewhere—that's another article.

The use of the HELLFIRE missile has only been briefly discussed. That is not to say that the HELLFIRE isn't useful in a LIC. My aviator friends from Ft. Bragg, NC, proved their worth in Panama when they needed pinpoint destruction.

Much of what I have written may seem basic. However, just count the number of guys in our Apache units with 1,000 hours or more in attack aircraft and much less combat experience. What you discover may surprise you. There is a new crop of young tigers in our units now, many of whom have not been taught the information in this article.

So strap one of those multimillion dollar noisemakers to your backside and give these ideas a try. Analyze what you find and put what works into your bag of tricks. I look forward to hearing your comments and trying your variations and new ideas. Good luck and good hunting.

# The AH-64 Apache Stinger Integration:

## An Insight to Weapons and Training

**CW3 Thelbert B. Lee**
6th Cavalry Brigade
Fort Hood, TX

THE ADVENT OF modern advanced helicopters such as the OH-58D Kiowa, UH-60A Black Hawk and AH-64 Apache has confirmed Army Aviation's commitment to fight and win on the future battlefield. These advanced aircraft tout phenomenal capabilities in weapons technology and maneuverability that will give the Army a decisive edge in combat. The ground commander will be given flexibility and options never realized under the AirLand Battle concept.

The completion of production proveout—government technical test (13 October 1988 through 10 February 1989) has provided data that characterize the performance parameters of air-to-air Stinger (ATAS) on the AH-64A. The ATAS system that was assessed reveals ideas on how Stinger will evolve in the scheme of weapons employment in the air-to-air (ATA) scenario.

A firm understanding of the weapons capabilities presently installed on the AH-64 provides insight on how Stinger will fill the void that exists in ATA combat operations.

The 30mm chain gun on the Apache is the weapon of choice for the close-in ATA battle. The ability to slew the gun off-axis provides a distinct advantage over fixed-gun weapon platforms. The disadvantage is the effective weapon range in which the battle will take place. The current 30mm on the AH-64 has a maximum range of 3,000 meters. With a rate of fire of 625 rounds per minute and a muzzle velocity of 860 meters per second, maximum effective engagement ranges for ATA combat will be significantly less that 1,500 meters. This undesirable situation moves the crew within the adversaries' weapons ranges and forfeits maximum stand-off capabilities.

Rockets allow helicopter engagements at ranges intermediate to those of missiles and guns. The maximum effective range of the Hydra 70 folding fin aerial rocket (FFAR) for direct fire is 7,000 meters. However, maximum ef-

fective range for rockets on the AH-64 is software limited to 6,500 meters. Rockets are suitable weapons for placing effective fire on enemy helicopter formations or for firing on helicopters in landing zones. Rockets are primarily used in diving or horizontally oriented attacks. While testing is not complete, flechette (nails) rounds show promise as the FFAR for air combat. Because of their nature, rocket engagements are subject to inaccuracies. Rapid depletion of rockets also can be expected since they are normally fired in salvos for maximum effectiveness. A preliminary test determined the number of rockets to be fired and the range to achieve the highest level of hit probability. This analysis showed that firing 3 pairs of rockets at a range of 2,000 to 2,500 meters would result in a 75- to 82-percent hit probability.

The HELLFIRE missile system on the AH-64 can be an effective ATA weapon against slow-moving or hovering targets at greater standoff ranges. This missile can be used to engage beyond the adversaries weapons and detection ranges. The disadvantage of HELLFIRE comes into play as the target's range decreases and moves within its own detection and engagement ranges. Airborne targets close to intermediate ranges may be difficult to engage with HELLFIRE because of the ability of the target to maneuver rapidly and mask in terrain. A laser guided missile requires that line-of-sight be maintained with the target throughout the engagement. HELLFIRE was designed for the air-to-ground (ATG) role and thereby lacks the maneuverability for airborne targets. Weather conditions and battlefield obscurations can significantly degrade HELLFIRE performance.

The introduction of Stinger to the weapons systems of the AH-64 significantly increases the capabilities of the aircraft in ATA combat. Stinger compliments current aircraft armament. It provides the crew with a passive infrared (IR) homing, better than a Mach 1, fire and forget, dedicated ATA missile.

Stinger is equally suited to operate in sky and terrain environments. This lightweight missile is readily available in the field, and is installed on the aircraft virtually unmodified. All four missiles can be uploaded and ready in seconds. The pilot or copilot gunner can employ the Stinger by using the integrated helmet and display sight subsystem (IHADSS) or the target acquisition and designation system (TADS). Integration of ATAS on the AH-64 provides off-axis slaving of the missile seeker. The missile seeker decreases target acquisition time and limits unnecessary aircraft maneuvering.

Stinger is ideally suited to the superior night-fighting capacity of the Apache. The forward looking infrared (FLIR) systems and powerful optics of TADS allow for maximum standoff missile employment. These systems also serve as good target identification. The night environment provides ideal operating conditions where targets provide a strong IR signature for FLIR detection and an excellent IR signal-to-noise ratio for Stinger acquisition. Its passive IR-homing seeker head allows Stinger to be fired without alerting hostile aircraft radar warning devices. Superior flight maneuverability makes Stinger extremely difficult to defeat by evasive maneuvering.

Capabilities of the Stinger are limited much like any other IR device. Factors such as terrain, weather, increased temperature and battlefield obscuration degrade the sensitivity of the Stinger. The IHADSS engagements also have night limitations because of the restriction that engagements are done in wide field of view (FOV). This can make target identification at intermediate ranges difficult. The TADS presently has the wide and medium FOV FLIR integrated for ATAS engagements. ATAS integration into the present weapons platform of the AH-64 gives the Apache unrivaled defensive coverage in the close-in as well as the standoff ATA battle.

Future additions to the AH-64 weapons platform also might include Sidewinder, Sidearm and Mistral, which have already been successfully fired in contractor testing. This will give the Apache a multimissile capability and adds new dimensions to current mission performance.

Many tactical scenarios will involve ATA combat with the ATG mission. The primary mission of the AH-64 is antiarmor. Within that primary mission, ATA combat will become a necessity to be able to continue with the original objective. The antiarmor mission will be severely jeopardized if the capability to defend against the air threat does not exist. In addition, munitions used for the ATG mission may be needlessly wasted while trying to counter the air threat.

Stinger will provide the commander with the ability to effectively counter and destroy enemy air threat. Particularly important,

the missile will afford the capability to defeat the air threat without becoming decisively engaged. Enemy air threat will be less likely to pursue an offensive air combat posture, once the significance of ATAS on the AH-64 Apache is common knowledge.

The pilot is the key to making these advanced aircraft perform their impressive capabilities. As aircraft have modernized, pilot training has lagged. Today's Army aviator graduates from flight school and aircraft qualification courses with basic flying skills and skills in tactical employment of his respective aircraft and weapon systems. Now the task of advanced tactical training for the individual is left to the unit to which he is assigned. However, the majority of training is collective and does not emphasize enough the individual's skill and proficiency. If our assets are to be employed to their maximum capacity, the void that exists in advanced tactical training for the individual aviator must be filled.

Over 10 years ago the Marine Corps recognized the need to conduct specialized advanced aviation training and to develop innovative tactics that reflect the modern battlefield. In 1976 the Marine Weapons and Tactics Training Program was established. The purpose of this program was to train experienced Marine Corps aviators in the most effective tactical employment of their current aircraft and weapons. The key element was to develop a Weapons and Tactics Instructor (WTI) Course and to ultimately place a WTI into each Marine aviation unit. The WTI Course is a comprehensive postgraduate course for Marine Corps instructor pilots. It includes academic instruction in threat analysis, weapons and systems capabilities, integrated operations planning, and training and management. In 1978 the program was commissioned Marine Aviation Weapons and Tactics Squadron-One (MAWTS-1), Yuma, AZ. Since that time, the Marines have amassed significant experience and data in the tactical employment of helicopters and weapons in the ATG and ATA scenarios.

The U.S. Army currently does not have a training program such as MAWTS-1 in existence. We are, however, moving forward to better prepare our aviators for the significant threat that will be present on the modern battlefield. The integration of ATAS on the OH-58C and D and the AH-64A proves that the U.S. Army is serious about protecting these valuable assets. Assets that will be lucrative targets in the sight of the enemy. An ATA combat maneuver training program has been developed.

Coordinating drafts of Training Circular 1-107, *Air Combat Operations*, and the *Commander's Guide to Air Combat Maneuver Training*, dated March 1988, are awaiting approval for future use. These manuals provide Army Aviation units, the commanders and aircrews with proposed tactics to be employed in the counter-air scenario.

The Army's air combat maneuver training will be completed with an exportable training package. The package consists of 24 flight and 21 academic hours. Aviation units use this package to train their pilots in ATA combat. There is a drawback, however, in that the ATA training program is optional. The unit commander must request it. If the commander desires the training, he must provide his own flight hours to complete the program.

ATA combat on the modern battlefield will not be optional; it is a real threat and it will definitely happen. The adage of suppress, report and bypass is not an option for the aircrew who have become decisively engaged by threat aircraft. Forced disengagement from a helicopter ATA battle is not possible; you fight or you will die. Only one aircraft will emerge to fight again and carry on with its mission. The aircraft that survives will bear superior weapons and an aircrew with superior fighting skills.

Many options are available to better train our pilots to fight and survive in combat. An advanced tactical training program could and should be developed to enhance our fighting skills. This program could be in the form of an add-on to our present Instructor Pilot Qualification Course. These advanced tactics-trained instructors could then return to their units and administer the training program to each pilot.

If that is not feasible, consideration should be given to using MAWTS-1 to train our instructors. The U.S. Army presently has exchange officers who are qualified WTIs and MAWTS-1s. Every effort should be made to use MAWTS-1 skills and training to establish our own advanced tactics program.

Advanced aircraft and weapons will only be as effective as the pilots who fly and employ them. The need for ATA weapons and training is overwhelming. The future battlefield will not be forgiving of those with inferior weapons and fighting skills.

# AVIATION PERSONNEL NOTES

**93P Security Clearances**

Your battalion is planning a field training exercise. The S2 provides you with a list of personnel with security clearances who will be authorized access to the tactical operations center (TOC). As the aviation operations noncommissioned officer (NCO) in charge, you scan the list of names. Most or all of the operations specialists who work for you are not on it; names are missing. You make a phone call to the S2 and tell him there must be a mistake on his list of names because none of your 93P aviation operations specialists are on it. He matter of factly tells you the list contains those personnel who have security clearances. At this time you start brainstorming on how to correct this problem. You know they cannot be used in the TOC and you cannot work 72 hours straight, so what can you do in order to successfully accomplish the mission? This scenario actually happens in many aviation units time and time again.

At this year's annual aviation NCO symposium at Ft. Rucker, AL, comprised of command sergeants major and sergeants major, 93P security clearances were discussed. The senior NCO panels declared the lack of security clearances a major problem and wanted this military occupational specialty (MOS) to have a security clearance requirement.

The Aviation Personnel Proponency was called on to investigate the issue. After a quick review of AR 611-201, *Military Occupational Classifications and Structure*, there was, in fact, *no requirement* for a security clearance. For a security clearance requirement to appear in AR 611-201, certain criteria must be met. The Military Occupational Classification Structure Guide governs changes to AR 611-201. First, there is the prerequisite that at least 50 percent of the MOS authorizations require access to classified information. For MOS 93P, requirements for a security clearance are well over 50 percent. The next prerequisite was to determine the level of security clearance necessary for the MOS. The Department of Defense requires every soldier who has access to classified material to obtain an appropriate clearance for the material handled. For 93P, the security clearance required is secret, since the predominate number of positions in the MOS will be handling secret material.

It is only fair that the 93P soldier be able to perform to prescribed standards. Clearly, the lack of an appropriate clearance does not allow that. The APP has submitted a change to require security clearances for all 93P soldiers. Pending approval, the transition period for full implementation into AR 611-201 will take from 18 to 24 months. If approved, the following changes will take place:

- Each new recruit will be required to have a security clearance to get into the MOS.
- Every soldier who is currently in the MOS must obtain a security clearance.
- Those personnel who are unable to obtain security clearances will be reclassified into another MOS.

For further information contact Master Sergeant Estes, APP, AUTOVON 558-4313/3423.

**Regular Army (RA) Integration Upon Promotion to Major**

A recent review of other than RA Active Component category majors has revealed some officers who have neither accepted nor declined their RA appointment. Under the provisions of the Defense Officer Personnel Management Act (DOPMA), officers must either accept the appointment by executing a Department of the Army (DA) Form 71 (Oath of Office) or decline in writing. There is a misunderstanding that this integration is automatic. This is not true.

In accordance with Army Regulation (AR) 601-100, *Appointment of Commissioned and Warrant Officers in the Regular Army*, officers are automatically considered for RA nomination upon selection to major. Once the nomination is approved by the President and confirmed by the Senate, the officer must either take the RA oath of office upon promotion to major and sign a DA Form 71 or decline the appointment in writing. The DA Form 71 or the declination is then forwarded through the officer's military personnel division to the U.S. Total Army Personnel Command (PERSCOM).

Pre-DOPMA officers on active duty before September 1981 have the option to accept or decline the RA appointment. However, if declined, the officer will not be able to serve more than 20 years active federal commissioned service. Post-DOPMA officers may decline. However, by law, they must leave Active duty within 90 days.

Contact your personnel assignments officer at PERSCOM for additional information.

**Aviation Publications Update**

The 1990 version of the Army Aviation Personnel Plan ($A^2P^2$) is scheduled for distribution in early December at the annual Aviation Commanders' Conference, Ft. Rucker, AL. Worldwide distribution will follow shortly thereafter. The 1990 version of $A^2P^2$ contains many changes that incorporate the latest in aviation personnel planning. It will answer questions that many of you have about your career development. Aviation soldiers and civilians are thanked for the input they provided over the past months that enabled the Aviation Personnel Proponency (APP) staff to address issues important to you. Your continued input is encouraged. With your help appropriate changes will be implemented for the 1991 edition.

The second edition of the U.S. Army Warrant Officer Flight Training (WOFT) program pamphlet was distributed in November. The pamphlet is sponsored by the U.S. Army Aviation Center, Ft. Rucker, AL, and is the sole-source document used by recruiters to answer almost any question about the WOFT program. This pamphlet applies to the Active Army, Army National Guard, and the U.S. Army Reserve. Because of monetary considerations, the primary distribution of these pamphlets is directed toward the U.S. Army Recruiting Command for use by its recruiters. A limited supply will be provided to retention and reenlistment offices. All potential applicants should review this pamphlet to determine the exact application procedure and individual prerequisites. See your local recruiter for details.

Aviation Digest

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# PEARL'S

*Personal Equipment And Rescue/survival Lowdown*

**The U.S. Army Aeromedical Research Laboratory (USAARL) Reminds Aviators to Check SPH-4 (Sling Suspension) Helmet Liners**

Our records show that the first correspondence on changing the old 3/8-inch polystyrene (styrofoam) liners to a 1/2-inch liner was written in 1976. The difference between these two is a 33 percent increase in impact protection when the 1/2-inch liner is used. A stockage of the old 3/8-inch liners was found and USAARL was asked if these are acceptable. The answer is no! The only acceptable liner for use in the SPH-4 helmet with the sling suspension is the 1/2-inch liner. We obviously prefer the thermoplastic liner system for crash protection, but we also understand funding constraints and appreciate unit aviation life support equipment (ALSE) shops that are continuing to get the job done with what they have. Our thanks to the 112th Medical Detachment, Maine Army National Guard, for showing the concern to ask the question.

Point of contact (POC) for USAARL is Mr. Joe Licina, AUTOVON 558-6893. POC for ALSE is Mr. Jim Angelos, AUTOVON 693-3574.

**Seat Belts for OV-1 Mohawk Ejection Seat**

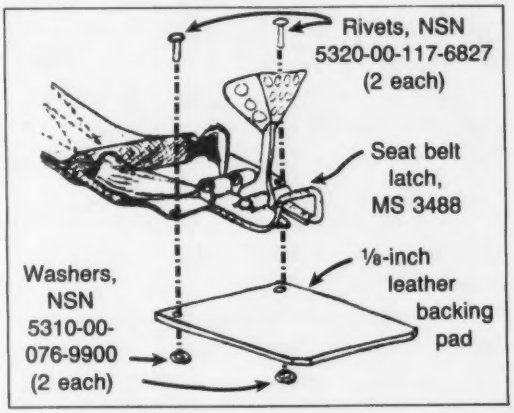
Mohawk units are reminded to save the koch fittings from their old OV-1 seat belts. These fittings are reusable. New seat belts, national stock number (NSN) 1680-01-232-9692, are procured without end fittings.

**More on Seat Belts**

Replacement of leather backing pad on standard aircraft seat belts is authorized. The following information will be included in the next change to Technical Manual 55-1500-204-25/1, *General Aircraft Maintenance Manual.*

To replace the leather backing pad, simply drill out the old attaching rivets to remove the leather. Using the old leather pad as a pattern, cut a new one from 1/8-inch thick natural leather.

Install the new leather pad using aluminum rivets, NSN 5320-00-117-6827, and washers, NSN 5310-00-076-9900, per the original construction (see figure).




*If you have a question about personal equipment or rescue/survival gear, write PEARL'S AMC Product Management Office, ATTN: AMCPM-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-3573 or Commercial 314-263-3573.*

AVIATION LOGISTICS
U.S. Army Aviation Logistics School

# THE KEYSTONE TO AIRCRAFT MAINTENANCE

**MW4 Jesse H. Dize**
U.S. Army Aviation Logistics School
Fort Eustis, VA

IT'S 1500 HOURS on Friday. Two slicks need a MOC (maintenance operational check) and a scout requires a test flight. Forty percent of the aircraft mechanics are involved in other military duties. All the shops have a work backlog. The "old man" is chewing on me about the maintenance section's physical training scores. And my new flight suit is already stained and smells like JP-4 jet fuel. Base operations just called to relay the field coordinates of an AH-1G Cobra down with a chip light. The scouts reported an OH-58 Kiowa red x'd for making funny noises. I won't make it home in time for supper again tonight. All in all, this is a typical day in the life of an aviation maintenance warrant officer.

I'm the unit's aviation maintenance technician, a warrant officer. The enlisted maintenance personnel are promoted out of shops and off the flightline. The commissioned officers move out and up to better things. However, the maintenance technician plays the aircraft maintenance game for years on end. The end result is that, by proxy, the aviation maintenance warrant officer is the institutional memory and technical subject matter expert (SME) for Army aircraft maintenance. In addition, the new tables of organization and equipment (TOEs) have added unit maintenance trainer to the maintenance technician warrant officer's list of responsibilities.

The mission of the U.S. Army is to serve and defend the United States of America. A major player in the Army's plan for mission accomplishment is Army Aviation. The mission of Army Aviation, simply stated, is to supply aircraft and aircraft crews to support the Army.

Army Aviation performs a multitude of combat, combat support and combat service support missions. Unimpeded by natural or manmade obstructions, Army aircraft can rapidly move troops, equipment and supplies from place to place. Helicopters can insert or extract troops, equipment and supplies from areas inaccessible to other means of transportation. Army aircraft perform a variety of missions to include airborne electronic interdiction;

electronic, photographic and visual reconnaissance; command and control functions; and air ambulance services. Helicopter gunships have the firepower necessary to provide cover for ground operations, attack enemy troop concentrations and disrupt enemy armor operations.

Only Army helicopters can accomplish a mission that requires the rapid movement of troops and firepower for long distances and over manmade and natural obstacles. Therefore, the most important function of Army Aviation is that of a "force multiplier." In this concept, the Army must move troops and firepower about the battlefield for rapid interdiction of enemy forces at critical positions. A key factor in identifying and timing enemy movements and selection of attack positions for the force multiplier will be real-time intelligence reports provided by Army reconnaissance aircraft. Intelligence data from other services is several hours old by the time it reaches the ground commander.

Aircraft, even new ones, will not remain mission capable for any length of time without preventive, diagnostic and repair maintenance operations. An ineffective maintenance program will quickly bring aviation operations to a halt with a resulting devastating effect on the Army's total mission. A crucial participant in any aircraft maintenance operation is the aviation maintenance warrant officer.

The aviation maintenance warrant officer technically is called an aviation maintenance technician. His job description states that he will organize, supervise, direct, implement and manage all phases of aircraft maintenance and aircraft maintenance support. Because of his training, background and experience, he is the organization's SME.

The two types of aviation maintenance technicians are rated and nonrated. The duties and responsibilities of each are the same. The rated technician performs the additional duties of maintenance test pilot.

In the aircraft maintenance environment, the nonrated technician normally will devote most of his activities to "in hangar" maintenance operations. These operations include involvement in all phases of major aircraft inspections and repairs, component repair and aircraft maintenance support functions. The rated technician normally will concentrate on operational readiness factors and flightline maintenance operations. These operations include minor inspections and repairs, preventive maintenance, flight control rigging and adjustments, maintenance operational checks and maintenance test flights. Both are actively and heavily involved in programing aircraft into scheduled maintenance operations.

Although not listed as a responsibility in any official publication, the aviation maintenance technician also has become the unit trainer for junior enlisted aircraft mechanics and crewchiefs. With the adoption of the new TOEs, this task fell to the technician. Many of the new TOEs reduced the number of noncommissioned officers (NCOs) assigned, while increasing the responsibilities of the remaining NCOs. A reduction in individual specialized training for the junior enlisted soldier was the result. To continue with the mission, the aviation maintenance technician assumed, as part of the implied duties of a maintenance manager, the role of teacher for these mechanics and crewchiefs.

Circumstances and events have given the aviation maintenance technician one final and implied function. He is the stabilization focal point for operating the aircraft maintenance organization. Aviation officers and NCOs are promoted out of the aircraft maintenance field just as they develop expertise. Their knowledge and experience leave with them. However, the aviation maintenance technician remains in the maintenance field, supervising, managing, implementing and teaching, while continuing to increase his level of expertise. He passes on his knowledge and experience to new members of the aviation maintenance community.

The aviation maintenance technician warrant officer is the keystone of an effective aircraft maintenance program. He is the driving force behind Army Aviation's ability to supply mission-capable aircraft to support the Army's total mission.

ATC FOCUS
U.S. Army Air Traffic Control Activity

# DOD National Airspace System Plan Update

**Mr. Raymond F. O'Neill Jr.**
ATC Requirements Specialist
U.S. Army Air Traffic Control Activity
Fort Rucker, AL

THE FEDERAL AVIATION ADMINISTRATION (FAA) published its first edition of the National Airspace System Plan (NASP) in 1981. The original NASP was the blueprint for modernization of the FAA portion of the National Airspace System (NAS). It contained 81 projects: advanced automation systems; communications systems; facilities; navigation systems; radar displays; weather display/weather reporting systems; and weather radar systems upgrades. The 1988 edition contained over 100 projects.

Department of Defense (DOD) completed its analysis of the plan in April 1985. DOD realized that a large portion of its equipment was at/or approaching its end-of-life-cycle usefulness. The equipment supports about 25 percent of the NAS and provides service to both civil and military users. It was also determined that DOD equipment, in most cases, would not be compatible with the modernized FAA equipment. Besides, the DOD study concluded that a more effective means of managing special use airspace (SUA) was needed.

DOD and FAA signed a memorandum of agreement (MOA) in December 1988. This memorandum basically is an agreement between DOD and the FAA to cooperatively upgrade the NAS. The MOA covers consolidation of facilities, joint manning of facilities and the procurement of like equipment. DOD also was given its own chapter in the FAA NASP (1989 edition).

The executive director, Policy Board for Federal Aviation (PBFA), became responsible for the DOD NASP modernization program. The PBFA was given the task of modernizing the DOD portion of the NAS with the current FAA $20+ billion modernization program. DOD has agreed to use, to the extent possible, FAA-like equipment. The equipment must be capable of supporting DOD-unique missions. The DOD goal is to gain economies of scale savings by using joint procurement programs, joint logistics and maintenance support and joint operator and maintenance training facilities.

The Air Force has been designated as the lead service in the program. It has established the DOD NASP Joint Program Office (JPO) at the U.S. Air Force Systems Command, Electronics Systems Division, Hanscom Air Force Base, MA. Program management, engineering, acquisition, operations and logistics personnel from each branch of the DOD will staff the office. Also, several civilian firms are presently under contract to support this modernization effort.

The JPO is responsible for all phases of the program: research and development, engineering, cost and operational effectiveness analysis, budgeting and integration and compatibility with the FAA system. The program manager (PM), JPO, also has been designated as the chairman, DOD National Airspace System Defense Acquisition Panel. The

designation of the PM to this position ensures a closed loop and meaningful information flow between the JPO and DOD.

Two DOD NASP offices in operation before the JPO organization, and also staffed by the joint services, will remain intact. The DOD National Airspace System Plan Requirements Office, FAA Headquarters, Washington, DC, will still be tasked to identify DOD-unique requirements to the FAA. This office also identifies conflicts between the FAA equipment capabilities and those that DOD has deemed to be mission essential.

The second office, the DOD Joint Program Coordinating Office, has been integrated into the JPO. It will be the Washington, DC, based coordinating and liaison office for the JPO. The U.S. Army Air Traffic Control Activity (USAATCA), Ft. Rucker, AL, has managed the Army's portion of the NASP modernization program to date. The U.S. Army Aeronautical Services Office (USAASO), Cameron Station, VA, has assisted. USAATCA has provided air traffic control (ATC) operations specialists, equipment specialists and engineering support to the NAS modernization program.

USAATCA's primary missions in the NASP modernization program have been to—

- Identify Army-unique mission requirements to support Army Aviation tactical training; i.e., nap-of-the-earth, night vision devices and range operations.
- Identify fixed-base ATC equipment and funding requirements. These assets provide for the safe mix of civil aircraft with DOD aircraft operating in both tactical and fixed-base training scenarios. They also provide ATC controller experience and proficiency training, which is directly transferable to the tactical environment.
- Manage SUA programs (those being developed to provide protection from the mounting civil pressures to give up and reduce the size of our already limited training areas). Many more mission areas are being studied and supported; these highlight just a few.

USAASO provides a direct link to the Department of the Army, Deputy Chief of Staff for Operations and Plans. This direct link has proven to be an invaluable asset, since the Army, for a long period of time, was the only service to have approved program money for this modernization effort. USAASO has also been the primary player in the DOD Military Airspace Management System (MAMS) program.

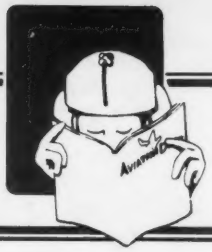
MAMS is a computerized SUA management system. It is designed to help us use our SUA more effectively. The system will provide a scheduling capability, which will give the SUA control authority a safer and modern means of airspace control. In addition, it will provide the SUA control authority an expeditious means of returning control to the FAA when the SUA is not in use. This is not only the fair and equitable way in which to operate, but is also expected to help reduce some of the civil pressures, which are being applied, to have the FAA control and schedule military SUA.

The latest change to the DOD NASP modernization program is an agreement between the executive director, DOD Policy Board on Federal Aviation, and the Director, DOD Test Facilities and Resources, Defense Research and Engineering (Test and Evaluation), to include military ranges and test facilities (MRTFs) in the modernization program. This change will generate additional airspace support requirements and studies of aircraft performance characteristics as they relate to the design and capabilities of the NASP modernization equipment. The bottom line is that some equipment parameters may have to be changed. Some consolidation of ATC facilities and MRTFs could take place. Studies are already being planned to identify the benefits and drawbacks of equipment specification changes and operating consolidated facilities.

Operational readiness dates for NASP modernization equipment in Army facilities will start in May 1997 and run through March 2003. Updates to the NASP modernization plan, soon to be changed to the NAS capital improvement plan, will be published periodically.

***Readers are encouraged to address matters concerning air traffic control to Commander, USAAVNC, ATTN: ATZQ-ATC-MO, Fort Rucker, AL 36362-5265.***

# VIEWS FROM READERS



Editor:

I am responding to an article, titled "Search and Rescue in the Deep Attack," that appeared in the January/February 1990 edition of the *Aviation Digest*. This is a safety warning!

The hookup illustrated on page 33 of that article (shown below) shows three snap links (snap hooks, carabiners) used in securing the extracted crewmember to the aircraft. It is the use and potential danger of those three snap links to which I want to draw your attention.

*The snap link was not designed or intended to be supporting weight across its narrow axis but rather across the long axis.*

• A carabiner is made to support the weight along the long axis as the gate (opening portion) provides strength when stressed. Carabiners that are made to meet United International Alpine Association specifications have a rating of 2,200 kilos force (kp) along the long axis and only 600 kp along the short axis. I seriously doubt that the military issue carabiners have a higher rating or are even tested by qualified sources.

*The middle snap link (shown in the article picture) could fail if the opening gate is placed facing on the helicopter step.*

• The picture shows the gate up; however, if there were an emergency situation, there is a high probability that, under stress of the situation, the carabiner could be placed gate down. This could cause the carabiner to open, allowing one of the other carabiners to slip out.

*"Metal to metal" contact is the least desirable situation when using carabiners.*

• There is a chance that twisting could occur during the transport phase of the rescue. I stated the strength rating of climbing carabiners above. These ratings are only under direct pulls along the axis, and not during a twisting action. There is a higher probability that the carabiners will fail under a twisting stress between two metal objects.

With the above mentioned warnings noted, I believe there could be a solution to the problem. By using either one of the methods listed below, the extracted will replace two of the snap links with either a tubular nylon or rope sling. One snap link will be inserted through both loops of the extraction harness and then through both loops of the sling, securing the extracted crewmember to the helicopter step. The sling could become standard issue to all pilots and crewmembers and would not take up any extra room. Another point is that all materials are readily available.

• Use 1-inch tubular nylon webbing, and tie into a loop using the bandschlingenknoten (band sling knot) as illustrated in the enclosed diagram (page 41). The knot will decrease the strength of the tubular nylon by 55 percent. To determine the strength of the tubular nylon (if not known), use the following formula:

width (cm) x depth (cm) x 20 = kp
25 cm x 2 cm x 20 = 1,000 kp

To determine the total strength with knot:

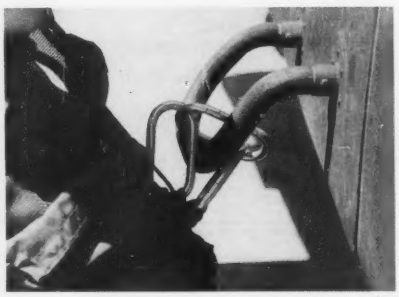
1,000 / .55 = 550 kp

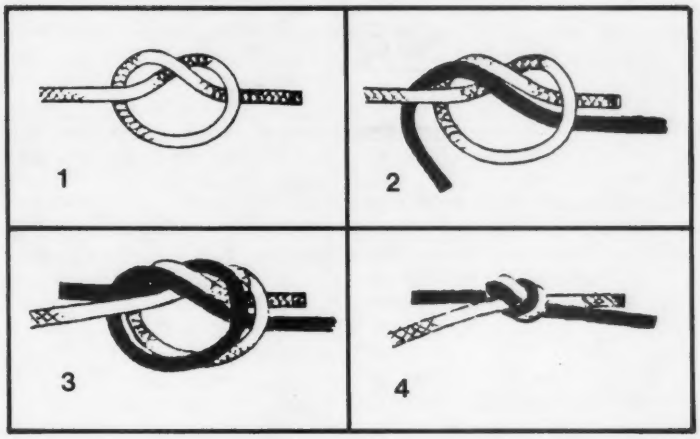
• Use regular climbing rope pieces (preferred) or government issue 120-foot nylon rope, and tie into a loop using either the spierenstich or Englischer spierenstich as illustrated in the enclosed diagram. Both knots decrease the rope strength in different amounts at 65 percent and 70 percent, respectively. Typical ratings for climbing ropes depend upon the diameter. For example:

| 11 mm | 9 mm | 7 mm | 5 mm |
|---|---|---|---|
| 2,100 kp | 1,700 kp | 1,100 kp | 500 kp |

When using any type of knots, it is important to recheck the knot before using. Because of the nature of nylon, the tubular nylon must be checked.

All aircrewmembers should know how to tie these knots for use in extraction as standing operating procedure for situations when the only






materials available are tubular nylon or rope.

Please accept this suggestion as an aid in developing an extraction system that accomplishes its intended purpose—to safely secure crewmembers to aircraft using materials available. My interest stems from the possibility of having to apply this technique if necessary.

Master Sergeant Gary Tollefson
ODA-113, Company A, 1st Bn
11th Special Forces Group (Abn)
U.S. Army Reserve
Ft. Devens, MA

Editor:

Captain Beckmann's article "Squawk 7700" in the July/August 1990 issue of the *Aviation Digest* hit the nail on the head concerning our current state of training for emergency instrument meteorological conditions (IMC) situations. A review of past *Flightfax* issues reveals a depressing regularity in mishaps resulting from attempts to remain visual when it is no longer possible, frequently in "brown-out" conditions during approaches.

Instructor pilots must train aviators to have confidence in their instrument flying abilities, including the aircrew training manual and vertical helicopter instrument recovery procedures (VHIRP) maneuvers, even at those installations without an approved VHIRP procedure.

I disagree with the recommendation for "establishing your own weather minimums that are higher than those in AR 95-1...." Rather than arbitrary individual minimums, installation aviation standardization committees should establish higher minimums when special circumstances exist. This is routinely done. Most Army airfield control zones have higher special visual flight rules minimums than civil control zones.

A better recommendation for avoiding an unplanned IMC situation comes from another article in the same issue: "Nothing Mysterious About What Makes a Good Pilot," by Major Lauran Paine Jr. "The good pilots get the job done. They will go to the limit but that is because they know what the limit is. They use—but do not abuse—limits. Minimums are sacred to them."

An aviator's decision to continue the mission, land or take some alternate course of action must be based on the mission priority, applicable regulations and the immediate conditions (aircraft equipment, crew composition, terrain, current and forecast weather, available alternatives, etc.), but ultimately is founded in training programs that result in a "Good Pilot."

CW4 Greg Reese
UH-1 Huey Standardization
Instructor Pilot/Instrument
Flight Examiner
Felker Army Airfield
Ft. Eustis, VA

Editor:

In the article "Where Have all the Flight Surgeons Gone?" the author attributes the lack of enthusiasm and volunteerism to the loss of flight training in the AFSPC (Army Flight Surgeon Primary Course). Perhaps one should look deeper into recent events in aviation medicine education for other reasons. Today the complexity of health care and the wellness of our aviators require a multidisciplined approach by aviation medicine. The recent policy change to exclude nonphysicians from the AFSPC might lend a clue as to why physicians themselves are reluctant to become involved in aviation medicine. Although the need clearly exists for nonphysicians to attend and graduate from AFSPC, the door has been slammed shut with no real supportable reason.

When one closely examines the purported reasons for this, it boils down to professional jealousy, elitism and parochialism. The course is not a "how to be a doc" clinical course but rather a preventive/occupational medicine course. Perhaps it is this elitist attitude that some in the aviation medicine education establishment have broadcast through this policy that has proved chilling to both the physician and nonphysician.

Now nonphysicians are isolated from aviation medicine by a myopic, self-aggrandizing policy, while physicians are isolated by the attitude this policy perpetuates. We are not being all we can be nor providing the best

comprehensive care to our aviators through the discouragement of physicians and nonphysicians to participate fully in aviation medicine.

Is it really lack of inflight training or is it lack of insight in policy decisions that discourages individuals from aviation medicine?

Robert L. Childress, DDS, MS
Colonel, DC
Commander, U. S. Army Dental Activity
Ft. Rucker, AL

Editor:

The May/June 1990 issue of the *Aviation Digest* contained an interesting article, "The 1989 World Helicopter Champions," written by CW4 Dan Kingsley on last year's overwhelming victory in the Sixth World Helicopter Championship. In it he credits me with being "single-handedly" responsible for the renewed interest in the competition. That's just a bit more credit than I'm willing to accept.

The facts are:

• On 28 March 1988, the President of the Helicopter Club of America, then COL John Zugschwert (Ret), wrote to the Secretary of Defense asking support for a U.S. Army team. Information copies of the letter were sent to the secretaries of the services and the commandant of the U.S. Coast Guard.

• On 21 June 1988, Secretary of Defense Carlucci replied to the effect that budgetary constraints precluded Department of Defense (DOD) support.

• John and I discussed our remaining options with the result being two additional letters. On 30 July 1988, I wrote to President Ronald Reagan requesting his support for a U.S. Army team.

• On 2 August 1988, John wrote to the Secretary of the Army with an information copy to Mr. Carlucci and asked that the decision of 21 June 1988 be reconsidered and reversed.

• On 23 November 1988, the Deputy Secretary of Defense replied that he had been asked to reconsider his decision by the Secretary of the Army who had informed him that the Army would fund and act as executive agent for DOD's participation. Mr. Taft added that a representative would be in contact concerning DOD support and establishment of a U.S. Army team.

Those are the published facts. Lots of people were involved in the renewed interest for a team. But, if any individual must be named as being single-handedly responsible, my vote goes for the Secretary of the Army. Backing for my vote came from MG Pat Brady, in early 1989, when he informed me that Mr. Marsh was somewhat bothered by the original decision and was the driving force in obtaining a reversal.

MG George W. Putnam Jr.
U.S. Army (Retired)
President, Helicopter Club of America
Dumfries, VA

Editor:

The Smoke/Obscurants Symposium XV will be held 16 to 18 April 1991 at the Kossiakoff Conference and Education Center, Johns Hopkins University, Laurel, MD. The theme of the Symposium is "Measures/Countermeasures." Topics to be presented are Smoke Systems and Materiel, Smoke Effects on Electromagnetic Systems, Natural Obscurants, Operational Uses of Smoke/Obscurants, Effects of Smoke/Obscurants on Health or the Environment and Obscuration on Sensors Overhead. The U.S. Army Chemical Research, Development and Engineering Center, Aberdeen Proving Ground, MD, is sponsoring the Symposium. Members of the Department of Defense, industry, academia and allied nations are invited to submit papers up to and including SECRET level on the aforementioned topics. Deadline for abstracts is 25 January 1991.

For further information contact Judy Cole, Symposium Coordinator, Commercial 804-865-7604, Telefax 804-865-8721; or Walter Klimek, Symposium Chairman, Commercial 301-671-2260, AUTOVON 584-2260 or Telefax 301-671-2968.

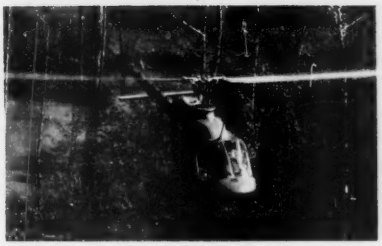
Editor:

I would like to commend CPT Mark R. Pedron on his article, "Seeing Better in the Dark," in the July/August 1990 issue of the *Aviation Digest*. However, one important piece of information was omitted. The U.S. Army developed the near-infrared projector. The official name for this device, as stated in the patent application, is "The Rusche-Intano Near-Infrared Projection System." Mr. Gerald Rusche, U.S. Army Center for Night Vision and Electro-Optics, Ft. Belvoir, VA, and Mr. Gabriel P. Intano, U.S. Army Research Institute Aviation Research and Development Activity, Ft. Rucker, AL, developed this system.

Although the U.S. Marines first installed this system, the U.S. Army Aviation Center and the U.S. Army Research Institute are conducting joint research to develop optimal training programs for both Ft. Rucker and the field. Please give credit where credit is due; the U.S. Army developed the system and intends to optimize its use.

Mr. Gabriel P. Intano
U.S. Army Research Institute
Ft. Rucker, AL

***Readers can obtain copies of material printed in any issue by writing to: Editor, U.S. Army Aviation Digest, P.O. Box 699, Fort Rucker, AL 36362-5042.***



# Enlisted Aeroscout Observer Course Update

**Captain James D. Bagwell**

SINCE OCTOBER 1985, the lst Battalion, 14th Aviation Regiment, Aviation Training Brigade, Ft. Rucker, AL, has been training a new breed of Army soldier: the enlisted aeroscout observer. The Enlisted Aeroscout Observer Course (EAOC), which is currently under revision, has operated for nearly 5 years.

However, the EAOC has drawn little attention from the aviation community, compared to other higher visibility programs. Unfortunately, this lack of visibility has fostered a lack of knowledge of the enlisted observer; for example, selection, training and cockpit functions.

Simply put, using an enlisted aeroscout observer is a cost-effective means of providing an additional set of eyes, ears and hands in the cockpit. This practice helps to reduce task overload and, more importantly, eliminates the requirement for two rated aviators per aircraft. By effectively doubling the number of available aircrews, commanders can maximize the operational time of their valuable aeroscout assets.

To ensure they can meet the demands of the field, student observers have a fast-paced and demanding training program covering a wide range of subject areas. In just over 13 weeks, the enlisted observer must acquire a working knowledge of air cavalry and attack helicopter operations. This is not an easy task, considering the program of instruction is limited to 67 flight hours (49 day, 13.8 night vision devices (NVD) and 4.2 night).

With requirements of the field and balancing them against a consistently lower budget, the enlisted observer should be proficient in the following areas: terrain flight mission planning; terrain flight navigation; navigation by pilotage and dead reckoning; radio or tactical communication procedures; actions on contact; and spot reports.

The observer should be equally as proficient in the following: call for or adjust indirect fire; target handover to attack helicopters; reconnaissance and security operations; night or NVD operations; emergency aircraft handling (9.1 hours minimum); and aviation safety. Additionally, student observers receive instruction in aircraft systems, assisting with routine and emergency checklist procedures, routine and emergency instrument flight procedures, and aeromedical factors.

The prerequisites for the EAOC are some of the most stringent of any military occupational specialty producing school in the Army. To qualify, a soldier must complete at least the following: an Armed Forces Comprehensive Test score of 105 or higher in the skills and technical aptitude area; a Flight Aptitude Selection Test score of 80; and a class II flight physical.

Given the recent thaw in superpower relations, coupled with an unprecedented budget deficit, the Army of the 1990s must prepare to do more with fewer resources. The enlisted aeroscout observer program will continue as a low-cost solution to maintain combat readiness on the battlefield of the future.

Captain James D. Bagwell was company commander, E Co, 1-14th Aviation, Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article.

# The Aerial Observer: A Leadership Challenge for the Aeroscout Platoon Sergeant

**Captain Timothy E. Drake and**
**Sergeant First Class James D. Norman**
4th Squadron, 6th Cavalry
Fort Hood, TX

BEFORE THE ADVENT of the enlisted aeroscout observer (AO), military occupational specialty (MOS) 93B, the aeroscout platoon sergeant (PSG), MOS 67V, had a primary focus. This focus was to train aircraft maintenance personnel, maintain aircraft and employ the aeroscout platoon in a tactical environment. Now, he must consider the additional challenge of supervising the AO. To be successful the PSG must familiarize himself with the aircrew training manual, flight regulations and the soldier's manual for 93Bs. Also, the AO has conflicting requirements for his time. Therefore, there must be intensive planning, management and coordination between platoon leader, PSG and instructor pilot (IP) when they prepare training schedules. Preparation and self-education mean longer days and a greater demand on the PSG's valuable time—a real challenge.

The aeroscout PSG faces unique responsibilities in the modern attack helicopter

squadron. He must be a maintenance supervisor, proficient in technical aircraft troubleshooting procedures. He must be a manager, articulate in support maintenance coordination between both aviation unit maintenance and aviation intermediate maintenance. Also, the responsibility for training his platoon in tactical employment and safe occupation of field assembly areas rests upon his shoulders. The size of his J-series unit is small, but the training is diverse and still leaves him with a great deal of responsibility.

The PSG must consider a different aspect to his daily training in leading his new enlisted soldiers—the AOs. The PSG must be knowledgeable with inflight requirements of aircrew training to enable him to train and counsel his AOs. Previously, the PSG supervised only soldiers of the same skill—observation helicopter repairer. Now in a higher skill level, he must expand his knowledge to enable him to become a competent leader.

Competing interests for the AO's training time demands constant communication and intensive management to reach a balance. The necessity for interface between PSG, platoon leader, and IP is ongoing and sometimes frustrating. The PSG's training time with his AOs is interrupted with day flights, night vision devices (NVD) flights and crew endurance periods. All of these are required to progress and maintain their aviator readiness level training. The weekly flight schedule regularly requires reverse cycle days to accommodate NVD training, and is in constant conflict with prime time training periods the PSG uses to train the platoon collectively. The result is competition for time to train the AOs in other essential soldiering tasks alongside the platoon.

Besides their individual flight training, the platoon leader trains his aircraft crews collectively to prepare for troop missions. Conducting multiaircraft operations and training is essential in preparing crews for combat. Still, it conflicts with the time the PSG has to prepare soldiers for essential tasks outside the cockpit such as skill qualification tests; nuclear, biological and chemical warfare; common task tests; and basic soldiering. Basic soldiering includes skills from marksmanship and land navigation, to wearing his uniform. The PSG is responsible for teaching these individual skills.

After the AOs exit the aircraft, the IP trains other officers in pilot skills. The other pilots are involved with their respective additional duties, and the AO's availability is limited by crew endurance for the next day's missions. Where does the PSG make up the needed time, and how can he help balance the AOs' time so they are proficient both in the aircraft and on the ground?

The aeroscout PSG must face these challenges daily. He must realize the AOs' training will be interrupted by their flight training—their primary skill.

# Proposed Airspace Reclassification

## A New Overall Concept as Simple as A, B, C

*This article is reprinted from the January-February 1990 FAA Aviation News.*

AS PART OF A worldwide effort to simplify and standardize airspace regulations, thereby improving the safety and convenience of flying, FAA is proposing to reclassify the entire U.S. airspace. Overlapping and unnecessary current configurations would be eliminated by the proposed rule, which would separate the airspace into six basic categories: A, B, C, D, E, and G. These categories are in line with recommendations of the International Civil Aeronautical Organization (ICAO). An additional class, Airspace F, which was also recommended by ICAO, is not in the FAA proposal.

For the most part, currently existing airspace regulations would not be changed. The few changes envisioned would reduce *distance from clouds* minimums for VFR flight in a TCA, and require two-way radio for all aircraft in the vicinity of an airport with an operating control tower. Control zones and Airport Traffic Areas would merge.

**NOTE: Special Use Airspace** (SUA) would not be affected by this reclassification. SUA includes airspace designated for military training purposes, such as Military Training Areas and Restricted Areas, as well as Prohibited Areas established for reasons of national security.

All other existing airspace designations would be re-named according to the following alphabetical categories. See the table at right for a summary; also pages 49 and 50 for detailed diagrams.

**Positive Control Airspace** (PCA) would become **Class A Airspace**. PCA is generally the airspace from 18,000' MSL up to 60,000' MSL (with certain differences in Alaska and a few Pacific

islands). In this airspace all operations must be conducted under instrument flight rules, and are subject to ATC clearances and instructions. Full Air Traffic Control service is provided.

*No changes are proposed when this type of airspace becomes Class A Airspace.*

**Terminal Control Areas** (TCA) would become **Class B Airspace**. A TCA is controlled airspace around the most heavily trafficked airports (and their satellites), extending from the surface or higher to specified altitudes, as indicated on appropriate charts. VFR as well as IFR operations may be conducted; all are subject to ATC clearance and instructions. ATC separation service is provided for all traffic. All aircraft are provided full Air Traffic services.

Additionally, *when a TCA becomes Class B Airspace, the required distance from clouds minimums for VFR flight would be reduced from 2,000 feet horizontally, 1,000 feet above, and 500 feet below to "clear of clouds." The visibility minimum would remain at least three miles.*

**Airspace Radar Service Areas** (ARSA) would become **Class C Airspace**. An ARSA consists of controlled airspace around a tower controlled airport, extending upward from the surface or higher to specified altitudes, according to the configurations shown on charts.

In this airspace both IFR and VFR operations are permitted. IFR aircraft are subject to Air Traffic Control clearances and instructions. VFR traffic must establish two-way radio communications with Air Traffic Control. ATC traffic separation is provided to IFR aircraft, and to VFR aircraft when necessary to avoid potential IFR/VFR conflicts. All VFR aircraft receive

**TABLE 1—Airspace Class Summary**

| AIRSPACE ATTRIBUTES | A (PCA) | B (TCA) | | C (ARSA) | | D (ATA) | | E | | E | | G | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Altitude Range | 180-600 | SFC- | | SFC-40 AGL | | SFC-40 AGL | | SFC-100 | | 100+ ABV | | SFC-12 | |
| Operations Allowed | IFR | IFR | VFR | IFR | VFR | IFR | VFR | IFR | VFR | IFR | VFR | IFR | VFR |
| Entry Prerequisites | ATC clearance | ATC clearance | | ATC clearance for IFR ops. Radio contact for all operations. | | ATC clearance for IFR ops. *Radio contact for all operations.* | | ATC clearance for IFR ops. None for VFR operations. | | ATC clearance for IFR ops. None for VFR operations. | | None | |
| Aircraft Separation | All | All | | IFR, SVFR, & Runway operations. | | IFR, SVFR, & Runway operations. | | IFR, SVFR | | IFR | | None | |
| Conflict Resolution | N/A | N/A | | Between IFR and VFR operations. | | NO | | NO | | NO | | NO | |
| Traffic Advisories | N/A | N/A | | YES | | Workload permitting | | Workload permitting | | Workload permitting | | Workload permitting | |
| Safety Advisories | YES | YES | | YES | | YES | | YES | | YES | | YES | |
| Minimum Pilot Qualifications | Instrument | *Student** | | Student | | Student | | Student | | Student | | Student | |
| Two-way Radio Comm. | YES | YES | YES | YES | YES | YES | *YES* | YES | NO | YES | NO | NO | NO |
| VFR Minimum Visibility | N/A | 3 miles | | 3 miles | | 3 miles | | 3 miles | | 5 miles | | 1 mile | |
| VFR Minimum Distance From Clouds | N/A | *Clear of clouds* | | 2,000 feet horizontally, 1,000 feet above, and 500 feet below. | | 2,000 feet horizontally, 1,000 feet above, and 500 feet below. | | 2,000 feet horizontally, 1,000 feet above, and 500 feet below. | | 1 mile horizontally, 1,000 feet above, and 1,000 feet below. | | Clear of clouds | |

☐ New Requirement

*Except at some airports. CFI Endorsement.

# Proposed Airspace Reclassification

traffic advisories and conflict resolution instructions.

No changes in operational requirements are proposed for this type of airspace. VFR visibility minimums are three miles. Minimum distance from clouds is 2,000 feet horizontally, 1,000 feet above and 500 feet below.

**Airport Traffic Areas** (ATA) and **Control Zones** with Federal towers would become **Class D Airspace**. An ATA is the airspace within a radius of five miles from the geographical center of a tower-controlled airport extending from the surface up to 3,000' AGL. Aircraft may operate IFR or VFR. IFR pilots are required to obtain ATC clearances.

Traffic separation is provided to IFR traffic only; all traffic receives traffic advisories and, upon request, conflict resolution instructions. Two-way radio contact is required for all aircraft.

**Airport Traffic Areas** are typically collocated with a **Control Zone**, which extends upward to 14,500' MSL, with various lateral extensions as needed. VFR aircraft operating above the ceiling of the ATA in VFR weather (three miles visibility, distance from clouds 2,000' horizontally, 1,000' above, 500' below) are not required to contact the control tower.

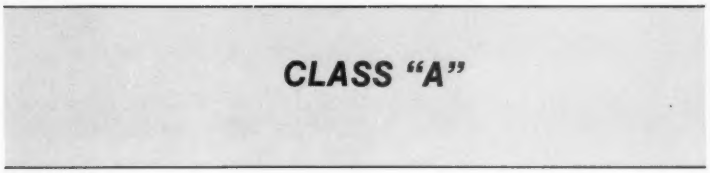
In the proposed reclassification, Control Zones with a Federal control tower and collocated with an ATA would also be classified as **Class D Airspace** and the common ceiling would be at 4,000' AGL. All aircraft in Class D Airspace would have the same operating requirements at all times; i.e., two-way radio and compliance with ATC clearances.

- **Controlled Airspace**, other than the preceding types of airspace, would become **Class E Airspace**. This would include the Continental Control Area (between 14,500' MSL and 18,000' MSL), control zones without air traffic control towers, transition areas, Federal airways, etc. Operations may be IFR or VFR, with separation provided for IFR aircraft only. Traffic advisories are available, as far as practical, to aircraft operating VFR. No operational requirement changes are anticipated.
- **Uncontrolled Airspace** would become **Class G Airspace**. Uncontrolled airspace begins at the surface, except as indicated on charts, where controlled airspace is designated to the surface. The ceiling is usually at 700' AGL or 1,200' AGL. Radio capability is not required. ATC separation service is not provided. However, traffic advisories may be available, conditions and workload permitting. VFR weather minimums during daylight are clear of clouds and one mile visibility (at night three miles visibility, and 2,000' horizontally from clouds, 1,000' above and 500' below). No changes are proposed for this airspace.

Copies of the complete rule may be obtained without charge from FAA, APA-200, Washington, D.C. 20591, or by calling (202) 267-3484. Request Notice No. 89-28, Airspace Reclassification.

*USAASO invites your questions comments and may be contacted at AUTOVON 284-7773.*

FL 600

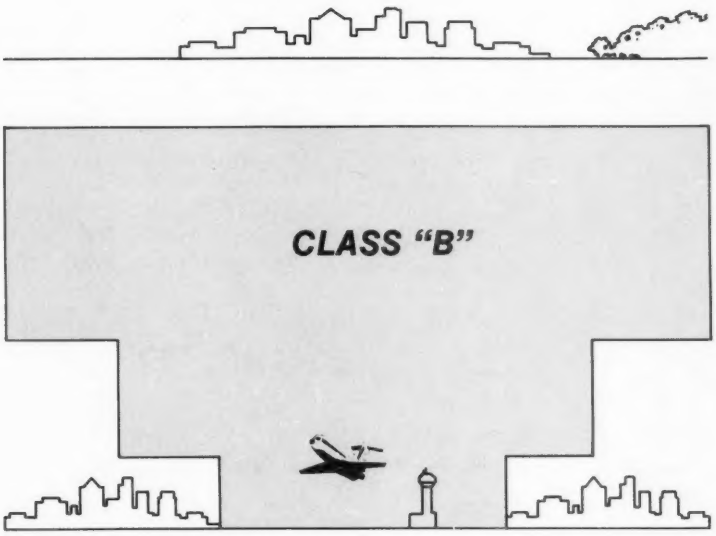



18,000′ MSL

**OPERATIONS:**
- IFR Only
- Two-way Radio Communications
- ATC Clearance

**SERVICE:**
- Aircraft Separation
- Safety Advisories

**CONFIGURATION:**
Replaces Positive Control Area, FL180 to FL600.




**OPERATIONS:**
- IFR, VFR and SVFR Allowed
- Transponder and Mode C
- Two-way Radio Communications
- Student Pilot Certificate*
- ATC Clearance
- VFR—Clear of Clouds/3 Miles

**SERVICE:**
- Aircraft Separation
- Safety Advisories

**CONFIGURATION:**
Identical to Current TCA's, as Shown on Charts.

*Except at some airports, CFI endorsements.

CLASS "C"

**OPERATIONS:**
- IFR, VFR and SVFR
- Two-way Radio Communications
- VFR—2000/1000/500 and 3 Miles

**SERVICE:**
- Aircraft Separation: IFR-IFR/SVFR/VFR
- Conflict Resolution: IFR-VFR
- Safety Advisories
- Traffic Advisories

**CONFIGURATION:**
Identical Current ARSA's, as Shown on Charts, Typically Surfact to 4,000′ AGL.

# Proposed Airspace Reclassification

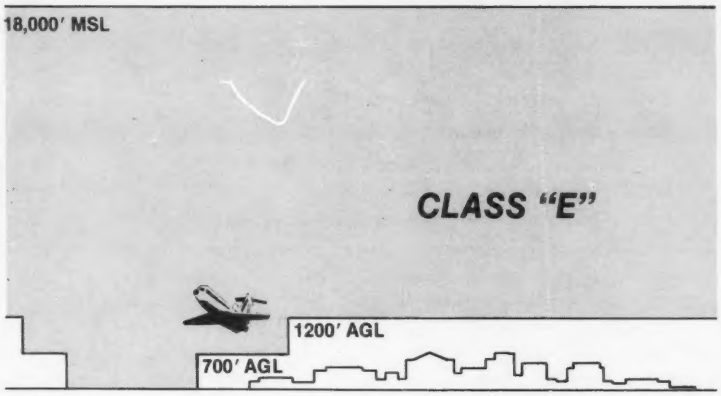
**OPERATIONS:**
- IFR, VFR and SVFR
- Two-way Radio Communications
- VFR—2000/1000/500 and 3 Miles

**SERVICE:**
- Aircraft Separation: IFR, IFR/SVFR
- Safety Advisories
- Traffic Advisories—Workload Permitting

**CONFIGURATION:**
Replaces Current ATA's and Control Zones (with Federal Towers), Common Ceiling at 4,000′ AGL.

**OPERATIONS:**
- IFR, VFR and SVFR
- VFR—2000/1000/500 and 3 Miles/1 Mile/1000/1000 and 5 Miles (10,000 MSL)

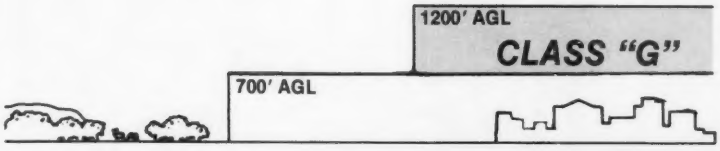
**CONFIGURATION:**
Various Other Forms of Controlled Airspace (Airways, Transition Areas, etc.) Shown on Chart Between Surface (or Ceiling of Uncontrolled Airspace) and FL 180.




**OPERATIONS:**
- IFR and VFR
- VFR—Clear of Clouds and 1 Mile

**SERVICE:**
- Safety Advisories
- Traffic Advisories—Workload Permitting

**CONFIGURATION:**
Uncontrolled Airspace from Surface to Indicated Floor of Controlled Airspace.



## Military Qualification Standard (MQS) System, *continued from page 1*

College (CGSC) level schooling; and prepare officers for service in positions of greater responsibility. It provides the bridge for officers to progress through the first and second milestones in their careers known as *passage points*. The requirements that comprise the passage points include completion of appropriate branch schools and developmental assignments, demonstrated proficiency on common and branch tasks, and completion of specified portions of the Foundation Reading Program. The *first passage point* occurs when officers enter their branch advanced courses. The *second passage point* occurs when officers complete their company grade careers and either enter resident CGSC or enroll in nonresident CGSC.

The MQS system provides commanders with the flexibility they need to establish leader development programs for their officers that complement their METL-based unit training programs. The focus of unit leader development programs must be warfighting and the METL. Therefore, commanders tailor both their MQS task training program and their professional reading program to support their METL-based unit training plans. MQS does not require commanders to train soldiers in tasks that do not support their unit METLs.

The MQS II implementation plan will involve distribution of both a common manual and branch manual. The MQS II common manual will be distributed during January to March 1991. Each lieutenant and captain will receive personal copies of the MQS II common manual fielded through pinpoint distribution. Unit commanders should ensure their pinpoint accounts accurately reflect both lieutenant and captain authorizations by branch. The U.S. Army Publications Distribution Center will ship the new manuals based on specific unit requirements identified on unit DA Form 12-99, *DA Form 12-Series Subscription Change Sheet*. The Aviation Branch manual is in draft. Now being staffed, it will be completed by December 1990.

The U.S. Army Aviation Center, Ft. Rucker, AL, will print and distribute the branch manuals to each individual lieutenant and captain. Once the manuals are fielded, distribution to newly commissioned officers will be accomplished through the Officer Basic Course.

The ATM and MQS are two separate systems that complement each other. Both remain a viable requirement for all members of the Aviation Branch. Moreover, they are valuable tools for commanders to use to ensure their officers are trained to the highest professional and technical standards.

Remember, MQS is a system of training based on the philosophy that officers are responsible for their duty performance. Ensure all receive a current copy of the appropriate manual. Check with your unit now to verify that your copies of the MQS II manuals are on order.

# Communication: A Vital Link

**Mr. M. Kevin Richardson**
U.S. Army Aviation Systems Command
St. Louis, MO

A CRITICAL element within any organization is open communication. Failure to provide for an exchange of information among individuals frequently results in an inefficient process. A perfect example of such a breakdown in communication may be found in the relationship between the field and the U.S. Army Aviation Systems Command (AVSCOM), St. Louis, MO, concerning Category I Deficiency Reports (DRs).

Everyone agrees with the definition of a Category I DR and the extreme urgency it implies. However, this is not always reflected in the way each of us communicates. Instead of dropping everything else to attend to this potential safety problem, everyone treats a Category I DR as merely another task during his or her duty. Department of the Army (DA) Pamphlet (Pam) 738-751, *Functional Users Manual for the Army Maintenance Management System—Aviation*, outlines actions to take. However, this pamphlet does not stress the importance of those actions. Even when the soldier takes every action outlined in DA Pam 738-751, the system often requires his continued attention. All too frequently, active participation is missing, particularly in exhibit processing.

The submitter of a Category I DR may consider his task complete after sending the DR to AVSCOM. The absence of further communication from the field can disguise the fact that the DR might be misrouted. Failure to stress the extreme urgency of the matter to supply and shipping personnel can result in the exhibit being handled routinely. By definition, a Category I DR is submitted on potentially life-threatening conditions.

To expedite the shipment of exhibit items, AVSCOM is active in trying to improve the shipment process. In some cases, AVSCOM gives authority to ship these exhibits commercially to have them at the analytical laboratory in the least amount of time. Although the process is successful, these items are no longer part of the routine transportation system. Assuming this transportation system will function with the same speed and concern as the originator creates another prime chance for a disastrous break in communication.

To improve the overall processing of DR exhibits, AVSCOM recently assembled a team of personnel experienced in each phase of exhibit processing. The team defines faults in the existing system and recommends methods to resolve these problems. The recurring theme behind problems identified was a basic lack of active communication. Nearly 2 years of gradual process improvements have occurred. The simple fact is that the greatest obstacle to resolving cases that required an exhibit investigation expeditiously, was lack of discussion at almost every step of the exhibit process.

Communications between AVSCOM and the DR submitter were too slow. The submitter often failed to transmit to AVSCOM the information necessary to trace the item once it had been shipped; therefore, items often could not be located. Even within AVSCOM, different directorates often neglected to communicate shared information. None of these communication failures were deliberate. Failures simply resulted from each individual assuming that, once his particular tasks were complete, the system no longer required his involvement.

Changes have been implemented within AVSCOM to provide open lines of communication. To facilitate communication between AVSCOM and submitting units, field logistics assistance representatives (LARs) were given broad authority to assist in processing and shipping exhibits. While these actions improved the process, the most critical communications link remains between AVSCOM and submitting units.

By internal standing operating procedures, the AVSCOM engineer who is the point of contact (POC) for a Category I DR responds to the submitting unit within 48 hours after receiving the DR message. During this initial response, the engineer should tell the submitter if an exhibit is required. If the exhibit is required, the submitter should ensure the exhibit item is maintained in a segregated, secure location until receipt of the formal written disposition instructions. These instructions are transmitted, either by message or telefax, directly to the submitter. To ensure receipt of these instructions, the engineer should follow up the transmission by contacting the submitting unit. At any time the submitter feels that the process is not responsive, he should contact the engineering POC or the Customer Feedback Center (CFC). The LAR will assist.

The exhibit disposition instructions are detailed, by necessity, in describing packaging and reporting requirements. At this point communications frequently fail. The exhibit must be packaged with the quality DR or equipment improvement report exhibit tag clearly visible. These tags are available from the AVSCOM CFC. The exhibit may then be transferred to a supply support activity. If it is, the submitter should ensure that any later packaging applied has one of these labels. *NOTE*: Adhesive backed labels will not remain attached to chemical agent resistant coating-treated surfaces. All information requested in the disposition instructions must be forwarded to the AVSCOM CFC. Should the exhibit be misrouted during shipment, this information will be used to trace the exhibit.

Once the exhibit has been shipped, the submitter is encouraged to follow up with the engineering POC or the CFC. Both the submitter and AVSCOM will benefit from an open exchange of information. Any information the unit wishes to provide to support the case is encouraged. Experience has shown that discussions between the submitter and the engineer often clarify the situation. These discussions sometimes prevent unnecessary time and resources in analyzing the exhibit.

In following up on the analysis of the exhibit, the submitter will be informed of the findings and the resulting actions required. Should the submitter require additional information, the engineer is available for discussion.

Failure to maintain open communication between the submitter and the engineer has generated a lack of confidence between these two. Hopefully, the actions recently begun by AVSCOM signify a first step in restoring this confidence. We encourage each submitting unit to request a status on any Category I DR case from the engineering POC. We are here to provide them support. The soldier has the greatest interest in the results of such action.

The following AVSCOM information is provided to improve overall communication:

**Address for Submitting Category I DRs**

| |
|---|
| Message: CDR USAAVSCOM ST LOUIS MO //AMSAV-E// |

**Telefax Number for Submitting Category I DRs**

| |
|---|
| AUTOVON/: 693-1622 |
| Commercial: 314-263-1622 |

**Telephone Number for Verbally Submitting Category I DRs**

| |
|---|
| During duty hours: AUTOVON/DSN: 693-1059/1630/1672/1687 |
| Commercial: 314-263-1059/1630/1672/1687 |
| After hours: AUTOVON/: 693-2066 |
| Commercial: 314-263-2066 |

**AVSCOM Customer Feedback Information**

| |
|---|
| Commander<br>U.S. Army AVSCOM<br>ATTN: AMSAV-QRF<br>4300 Goodfellow Boulevard<br>St. Louis, MO 63120-1798 |
| AUTOVON/DSN: 693-1758<br>Commercial: 314-263-1758<br>Telefax: AUTOVON/: 693-1761<br>Commercial: 314-263-1761 |

# We're Not in Kansas Anymore Toto

## An Aviator at Ft. Huachuca

**CPT Herman R. Lukow II**
Captain Lukow was attending Officer Advanced Course 89-05B, Fort Rucker, Alabama, when he wrote this article.

THIS ARTICLE relates my experiences while I attended the Military Intelligence Officer's Transition Course (MIOTC), Ft. Huachuca, AZ. This course is interesting and eye opening, especially for us who are used to viewing the world through a smoked visor. The 10-week course is designed to turn selected combat arms officers into full-blown military intelligence (MI) officers. In addition, aviation commissioned officers who have been tracked into the special electronic mission aircraft (SEMA) role must attend.

As I tearfully packed my flight gear for the move to Ft. Huachuca, many things came to mind. I had always wondered how the Field Artillery and MI guys felt among the Nomex-clad masses of Ft. Rucker, AL. I was about to find out. After almost 4 years in the warm arms of Army Aviation, I was about to become a visitor to another planet.

**The Adventure Begins**

I was not alone. When Officer Transition Course (OTC) class number 89-04 formed for the first time, I saw that I was surrounded by 39 other "visitors." Among this group were three other aviators doing the same thing as I. I felt safe when I saw that the Infantry, Armor and Field Artillery were there. None of us had a clear picture of what the future held. All we knew was that we could not start the advanced course until we went through OTC. OTC is the MI Officer Basic Course compressed into 10 weeks. More formally, it trains selected combat arms officers who have branch transferred to be tactical intelligence officers.

**I'm Drowning**

I quickly learned what the expression "trying to take a drink from a firehose" means. From the first day of class the instruction was intense, detailed and challenging. Security was the first subject taught. I learned more about personnel, physical, document, information and automation security than I had ever cared to. During these

classes I learned how to classify, mark, wrap, fold, tape, read, lock, burn, shred, count and carry classified information. At the end of the first week I felt that I knew more about security than any battalion S2. I was relieved when I passed the test.

**Comrade**

My joy was short lived. The class was next introduced to the "threat instructor from hell." He had only one purpose in life—to make us, within 2 weeks, become intimately familiar with Soviet equipment, organization and tactics from squad through front levels. I learned how the bad guys deploy their assets and how they arrange their forces for the attack. I learned about antitank hand grenades (RPGs), modernized general purpose machineguns Kalashnikov (PKMs), armored personnel carriers (BTRs), infantry combat vehicles (BMPs), motorized rifle regiments (MRRs), guard motorized rifle divisions (GMRDs) and light combat transport vehicles (MT-LBs). I now often dream of a Soviet motorized rifle division in the attack against a strong defense. Needless to say, there was great celebration at the club after the test.

**A Cute Little Name**

I thought it had to be downhill from this point. After all, I could classify, mark, wrap, fold, tape, read, lock, burn, shred, count and carry classified information. I knew about RPGs, PKMs, BTRs, BMPs, MRRs, GMRDs and MT-LBs. But it wasn't all downhill. It seemed odd there hadn't been any instruction on the friendly MI stuff. Sure enough it came. It is called MI OREO, a cute and purposely deceptive name for MI Organization, Equipment and Operations. For the next week my fellow visitors and I learned about every piece of equipment in the MI inventory. We learned how MI units are organized from platoon up to corps. We learned how the stuff is deployed on the battlefield and what it provides to the commander. I now know about TEAMMATES, TEAMPACKS, TRAFFICJAMS AND TACJAMS. If you have any questions on milkeys, tilkeys or turkeys, I'm the guy to ask. With a sigh of relief and a wipe of my brow, I passed the test.

**More Fun Than a Jumbo Coloring Book**

To my horror, I learned that everything up to this point was just a warmup for the next block. Intelligence preparation of the battlefield (IPB) was the next challenge. IPB is a five-step process that allows the commander to "see the battlefield." In the simplest of terms, the S2 analyzes the effects of terrain and weather on the enemy and friendly actions. Then the S2 makes an educated guess on what the enemy will do next based how they are equipped. For the next couple of weeks I learned about no-go, slow-go and key terrain; water, cultural and manmade obstacles; doctrinal, situational and decision support templates; and enemy, friendly and air avenues of approach. (I also learned that it does not take long to transfer most of the graphics from a map to your arm if you are not careful during this process.) I am now an expert. Give me a handful of colored markers and I can mark up a perfectly good map in the grandest tradition of S2s.

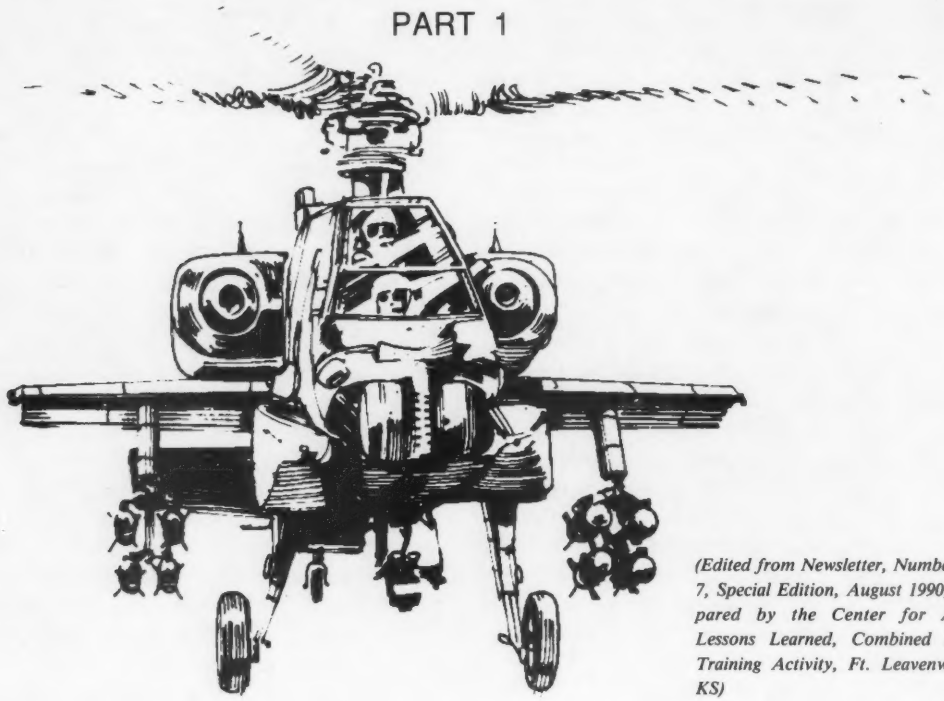
**Conclusion**

Actually, there is much more to the course than just security, threat, OREO and IPB. Some other subjects are targeting, processing and reporting. There also is a 4-day field exercise where everything is tied together. The sheer volume of information is incredible. An aviation commissioned officer who wants to do something new and challenging should look at tracking into the SEMA field.

Next, I attended the MI Officer's Advanced Course. I still yearned for the sound of beating rotor blades. Every now and then I pulled out my E6B and worked out wind problems. I put on my flight suit only when I read *Aviation Digest*, but if I had it to do all over again...I would.

# WINNING IN THE DESERT

PART 1



*(Edited from Newsletter, Number 90-7, Special Edition, August 1990, prepared by the Center for Army Lessons Learned, Combined Arms Training Activity, Ft. Leavenworth, KS)*

## DESERT ENVIRONMENT

THE DESERT IS HARSH; living conditions can be extremely uncomfortable; and the desert can easily kill an unprepared soldier. The desert can pose a constant challenge to every soldier, and each must be physically, mentally, and professionally prepared to meet this challenge. This information describes characteristics of the desert and its effects on personnel and equipment (part 2).

Deserts are arid, barren regions of the earth, incapable of supporting abundant plant life because of the lack of fresh water. Temperatures vary according to latitude and season. Day to night temperatures can vary as much as 70 degrees Fahrenheit (F). Some plants and animals have successfully adapted to desert conditions where annual rainfall may vary from 0 to 10 inches, but this is often unpredictable. Desert terrain also varies from place to place, the common factor being lack of water.

**Terrain**

There are three types of deserts: mountain, rocky plateau, and sandy or dune.

Mountain deserts have scattered ranges or areas of barren hills or mountains separated by dry, flat basins. High ground may rise gradually or abruptly from flat to a height of several thousand feet. Most of the infrequent rainfall occurs on high ground

and runs off rapidly in the form of flash floods, eroding deep gullies and ravines, leaving sand and gravel around the edges of basins.

Rocky plateaus are relatively flat with places where solid or broken rock occurs at or near the surface. There may be wet or dry, steep-walled eroded valleys known as wadis in the Middle East.

Sandy or dune deserts are extensive, flat areas covered with sand or gravel, the product of ancient deposits or modern wind erosions. "Flat" is relative in this case, as some areas may contain sand dunes that are over 1,000 feet high and 10 to 15 miles long. Trafficability in such areas will depend on windward or leeward gradients of the dunes and texture of the sand. Other areas may be totally flat for distances of 3,000 meters or more.

**Climate and Weather**

The highest known air temperature recorded in deserts was 136 degrees F. Lower temperatures than this produced internal tank temperatures of about 160 degrees F in the Sahara Desert during World War II. The cloudless sky of the desert will permit the earth to heat up during the day, yet cool to near freezing at night.

Desert winds can achieve almost hurricane force; dust and sand suspended within them can make life almost intolerable, maintenance very difficult, and restrict visibility to a few meters. Sometimes these winds can last for days at a time. Although there is no danger of your being buried alive by a sandstorm, you can become separated from your unit. In all deserts, rapid temperature changes invariably follow strong winds.

The most common characteristic of all deserts is the lack of water. Rain may consist of one single violent storm in a year. That causes high surface water runoff which, depending on soil consistency, will either reduce trafficability in loam of wadis or somewhat improve it if the terrain is pure sand. Precipitation may occur in the form of hail even though ground temperature is in the 90s. Also, rain occurring as much as several hundred miles away can cause flooding in another distant location. Otherwise dry stream beds can suddenly become hazardous as a channel of flooding.

Therefore, minimize the time you spend in these low-lying areas. Do not set up camp in dry stream beds; stories of walls of water 10 feet high roaring through them are true. Beware of rain clouds you see in the distance. Stay out of wadis!

Remember, lightning does strike frequently in the desert. Again, don't panic, keep exposure down to a minimum. Track vehicles are grounded, so you're better off inside than running around in the open.

A powerful sun and low cloud density combine to produce unusually bright and glaring light conditions during the day. In certain circumstances, light allows such unlimited visibility that gross underestimation of distance is common. Look at the base of mountains when judging distances. Visibility conditions may, however, be degraded by mirages or heat shimmer, especially if you are looking into the sun or through optics. Because mirages distort the shape of objects, particularly in the vertical dimension, positions you select for observation posts should be as high as possible.

Vision with night observation devices and even with the naked eye is extremely good on moonlit nights. A good way to measure distance is the use of the vehicle's odometer.

**Vegetation and Wildlife**

The vegetation and wildlife of a desert have physiologically adapted to the conditions. Some plants have extensive lateral root systems to take advantage of the occasional rain, while others have deep roots to reach subsurface water. For example, a palm tree indicates there is water within 2 to 3 feet of the surface; salt grass implies that water is about 6 feet deep; cottonwood and willow trees indicate water at a depth of 10 to 12 feet.

The available vegetation is usually inadequate to provide much shade, shelter, or concealment, especially from the air. Lack of natural concealment has been known to induce temporary agoraphobia (fear of open spaces) in some soldiers new to the desert, but this fear normally disappears after acclimation.

Invertebrates, such as ground dwelling spiders, scorpions, and centipedes, together with insects of almost every type, are found in quantity in the desert. Drawn to man as a source of moisture or food, lice, mites, and flies can be unpleasant and carry diseases such as scrub typhus and dysentery. The stings of many scorpions and the bites of centipedes or spiders can be extremely painful, though seldom fatal. Some species of scorpions and spiders, however, can cause death. When you camp, check your clothes and shoes before putting them on every morning; in heavily infested areas, they may invade these items at night.

Snakes and reptiles are perhaps the most characteristic group of desert animals. Lizards and snakes occur in quantity, and snakes are probably the most common threat. Watch where you step. They are especially active at night during hot weather, and may be seen coiled in shady spots during the day.

Take no chances and treat all snake bites as poisonous. According to advice from the Preventive Medicine Service, U.S. Army Aeromedical Center, Ft. Rucker, AL, follow these first aid steps for snake bites:

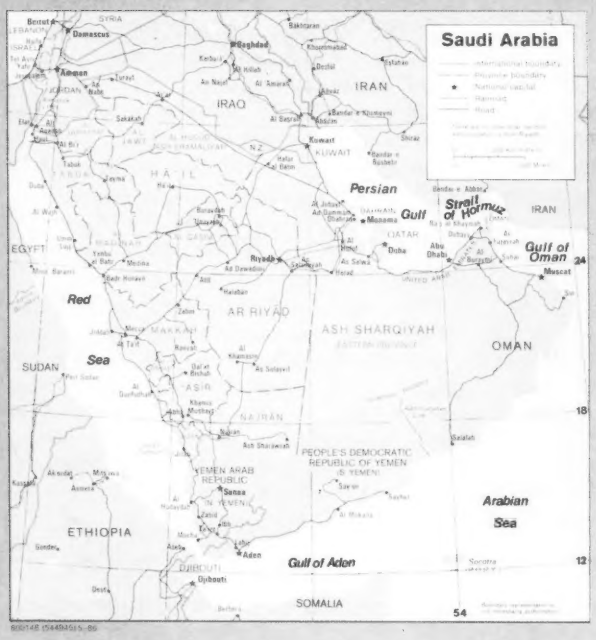
Specific Steps—

- Put victim at rest and keep that person warm.
- Remove rings and restrictive items from victim.
- Lightly immobilize injured part in functionable position; keep just below victim's heart level.
- Give victim plenty of reassurance.
- Transport victim to medical facility as soon as possible.

DON'T PLAY WITH SNAKES!
BEFORE PUTTING CLOTHES ON IN THE FIELD, CHECK FOR CRITTERS!

General Steps—

- Observe all patients for minimum of 4 hours, even when they seem to have no symptoms or signs.
- Do not leave patient unattended.
- Do not delay transport.
- Do not use ice or other cold applications.
- Do not apply tourniquet.




## SAUDI ARABIA
## Geography and Climate

Saudi Arabia is a large country. It occupies most of the Arabian Peninsula, an area about the size of the United States east of the Mississippi River. Its exact size is uncertain, because many of its boundaries are not firmly defined. It is about 2,217,949 square kilometers. The vast majority of its territory is desert.

Saudi Arabia has three great deserts. The Nafud in the north along the Saudi borders with Jordan and Iraq. The Ad Dahna runs from northern Saudi Arabia along the Saudi-Iraqi neutral zone south through the center of the country. The third and largest

**Desert Driving Techniques**

Sandy desert may be relatively flat or broken up by dunes. When driving in sand, the following techniques should be used:

The best time to drive on sand is at night or early morning when the sand is damp and traction is better.

Be wary of a lack of steering response in your tracks; this indicates that sand is building up between the rear sprockets and treads. If you allow this to continue, the sand will build up and force the track off. "Shaking" the vehicle with the steering or backing up will throw off the sand.

Loads must be evenly distributed. You should use rear wheel drive when necessary to avoid digging in the front wheels. Switch to all wheel drive or change gears before a vehicle bogs down.

Before entering sand, you should select a gear that will allow your vehicle to keep as much torque as possible without causing the wheels to spin and to minimize changing gears.

Some areas will be covered by a surface crust. This is caused by chemicals cementing sand particles together. In some cases, it will be possible to drive on this crust; therefore, keeping the dust down.

Crossing dunes requires careful reconnaissance. Normally, the upwind side of a dune will be covered by a crust and have a fairly gradual slope. The downwind side will be steeper and have no crust. Before crossing a dune, you should climb it on foot. Check crust thickness, angle of crest to ensure the vehicle will not become bellied up at the top, and degree of slope and softness of the downwind side. If you are satisfied your vehicle can climb the dune, you should drive the vehicle straight up the dune at best speed, crest it and maintain a controlled descent on the other side.

desert is the Rub Al Khali. The Rub Al Khali is over a half million square kilometers in area and is located along the Saudi southern border with Yemen and Oman.

Western Saudi Arabia, along the Red Sea, is made up of two mountain ranges, the Hijaz in the north and the Asir in the south. Although both ranges are low, the Hijaz rises between 2,000 and 6,000 feet and the Asir up to 9,000 feet. Both are rocky and steep, especially on the western sides. On the eastern sides, both slope gradually down to an extensive rocky plateau called the Najd. The Najd extends east to the center of the Arabian Peninsula where it meets the Ad Dahna Desert.

East of the Ad Dahna is another rock plateau, the Summan Plateau. Lower in elevation than the Najd, the Summan Plateau gradually drops in elevation to the flat coastal plains along the Persian Gulf.

Saudi Arabia has a desert climate characterized by extremely high temperatures during the day and sharp drops in temperatures at night. The temperature along the coastal regions near the Red Sea and the Persian Gulf is moderated by the presence of these bodies of water. In these areas, the temperature seldom rises above 100 degrees F, but the relative humidity is unusually high. Inland, on the rocky plateaus of Najd and Summan, as well as in the deserts, the temperature can reach as high as 130 degrees F. The heat gains intensity immediately after sunrise and dissipates at sunset, producing relatively cool nights. The almost nonexistent humidity of the central plateaus and deserts, combined with relatively low temperatures, can make nights on the Arabian Peninsula seem bitterly cold.

For most of the country, rainfall is slight and erratic. A region's entire annual rainfall may come in one torrential downpour. For this reason, most of the country's scarce water supply comes from springs and artesian wells. In the central portion of Saudi Arabia, Najd and the three deserts' natural wells and springs are few and scattered. Water must be hauled or pumped to the surface and its quality may be poor.

In Eastern Arabia and western mountains, wells and springs are relatively more common. Large numbers of these wells and springs in local areas constitute oases where the water is used for irrigation and agriculture.

The wind may build up sand around shrubs and form hills. Do not try to drive wheeled vehicles through these areas without engineer assistance.

Cacti or thorn bushes will cause frequent tire punctures. When operating in areas with this type of vegetation, you will need to increase the number of tires carried in your unit's prescribed load list.

Rock and boulder-strewn areas, including lava beds, may extend for many miles. Desert rocks, eroded and sharp-edged, vary in size and are so numerous that it is almost impossible to avoid any but the largest. The harsh jolting will wear you out and severely wear tracks, wheels, springs and shock absorbers. Vehicles can follow one another in this type of terrain, and it may be possible to reconnoiter and mark a route.

Get a rolling effect as you cross large rocks by braking as your vehicle wheels ride over a rock so the axle settles relatively gently on the other side.

**Getting Lost or Stranded**

People die every year in the desert, because they don't know what to do if lost or stranded. It is a good idea to have at least two vehicles in your traveling party (use the buddy system). When driving, avoid going down steep slopes. Your vehicle may not be able to climb back up.

Look for washouts, large rocks, and deep sand. If you get stuck, try jacking the vehicle up and then placing boards, brush, or blankets under the tires. Always let someone know where you are going, when you plan to return, and when to start searching if you don't return. Don't forget to check in when you return!

If lost, DON'T PANIC. Remember, the sun rises in the east and sets in the west. When departing from your field site, know your direction. If needed, make a field expedient compass. Put a stick in the ground and lay a rock at the end of the

## IRAQ
## Geography and Climate

Iraq's geography is discussed in terms of four main regions: the desert in the west and southwest; the rolling upland between the Tigris and Euphrates rivers (in Arabic, the Dijhis and Furat, respectively); the highlands in the northeast; and the central and southeastern alluvial plain through which the Tigris and Euphrates flow. Iraq's total land area is about 435,000 square kilometers.

The desert zone, lying west and southwest of the Euphrates river, is a part of the Syrian Desert. The region is sparsely populated and consists of a wide stoney plain interspersed with rare sandy stretches. A widely scattered pattern of wadis runs from the border to the Euphrates. Some wadis are more than 400

shadow from the stick. Wait 15 minutes. Draw a line from the rock to the new end of the shadow. The line represents the east-west line. In the morning, the rock will be the west end; in the afternoon, the rock will be the east end.

If your vehicle breaks down, stay near it. Your emergency supplies are there. Your vehicle has many other items useful in an emergency. Raise the hood and trunk lid to denote "help needed." A vehicle can be seen for miles, but a person on foot is very difficult to find. Tie a white or light-colored cloth to your antenna. Use mirrors and burn oil for signaling. When not moving, use available shade or erect shade from tarps, blankets, seat covers—anything to reduce the direct rays of the sun. Do not sit or lie directly on the ground; it may be 30 degrees or more hotter than the air. If you have water, DRINK IT. Do not ration it. If water is limited, keep your mouth shut. DO NOT TALK, eat, smoke, drink alcoholic beverages, or take salt. Keep your clothing on. It helps keep the body temperature down and reduces the dehydration rate. COVER YOUR HEAD. If a hat or cap isn't handy, improvise.

**Sleeping in the Desert**

The desert has few areas that offer protection, such as trees, from large vehicles. During short halts, sleep in or on your vehicle. When halting for more than an hour or so, designate a sleeping area that has a protective perimeter and always let someone know where you plan to sleep. When moving vehicles into an area where troops might be sleeping, use ground guides to look for sleeping troops. Do not sleep directly on the ground; besides the ground being hotter than the air above ground, snakes, spiders, and scorpions will have more difficulty in getting to you if you're on a cot.

kilometers long and carry brief, but torrential, floods during the winter rains.

The uplands region, between the Tigris north of Samarra and the Euphrates north of Hit, is known as Al Jazirah and is part of a larger area that extends westward into Syria, between the two rivers, and into Turkey. Water in the area flows in deeply cut valleys. Much of this zone may be classified as desert.

The northeastern highlands begin just south of a line drawn from Mosul to Kirkuk, and they extend to the borders with Turkey and Iran. High grounds, separated by broad, undulating steppes, give way to mountains ranging from 1,000 to 4,000 meters near the borders. Except for a few valleys, the mountain area proper is suitable only for grazing in the foothills and steppes; adequate soil and rainfall make cultivation possible. Iraq's largest oil fields are located near Mosul and Kirkuk.

The alluvial plain begins north of Bagdad and extends to the Persian Gulf. The Tigris and Euphrates rivers lie above the level of the plain in many areas in this region. The whole area is a delta interlaced by the channels of the two rivers and by irrigation canals. Intermittent lakes, fed by the rivers in flood, also characterize southeastern Iraq.

A fairly large area just above the merging of the two rivers at Al Qurnah and extending east of the Tigris beyond the Iranian Border is marshland, known as the Hawr al Hammerar. Much of it is permanent marsh, but some parts dry out in early winter, and other parts become marshland only in years of great flood.

Roughly 90 percent of the annual rainfall occurs between November and April, most of it from December through March. The remaining 6 months, particularly June, July, and August, at around 102 degrees F, are dry. The summer months are marked by two types of wind. The southerly and southeasternly Sharqi, a dry, dusty wind with occasional gusts of 80 kilometers an hour, occurs from April to early June and again from late September through November.

From mid-June to mid-September, the prevailing wind, called the Shamal, is from the north and northwest. It is a steady wind, absent only occasionally during this period. The very dry air brought by this Shamal permits intensive heating of the land by the sun, but the breeze has some cooling effect.

# ENVIRONMENTAL EFFECTS ON PERSONNEL

There is no reason to fear the desert environment. It should not adversely affect your morale if you are prepared for it, provided you take certain precautions to protect yourself and your equipment. Remember, there is nothing unique about either living or fighting in the desert; native tribesmen have lived in the Sahara for thousands of years. The British maintained a field army and won a campaign in the Western Desert in World War II at the far end of a 12,000-mile line of communication. Their equipment was considerably inferior to that of today. The desert is essentially neutral, affecting both sides equally; the side that has better trained personnel for desert operations has a distinct advantage.

Acclimation to heat is necessary to permit your body to reach and maintain efficiency in its cooling process. Two weeks should be allowed for acclimation, with progressive degrees of heat exposure and physical exertion. Although this strengthens your heat resistance, there is no such thing as total protection against the debilitating effects of heat.

**Sun, Wind, and Sand**

The sun's rays, either direct or bounced off the ground, affect your skin and can also produce eyestrain and temporarily impair vision. Overexposure will cause sunburn. People with fair, freckled skin, ruddy complexion, or red hair are more susceptible to sunburn than others, but all are susceptible to some degree. You should acquire a suntan in gradual degrees in the early morning or late afternoon to gain some protection against sunburn. You should not expose the bare skin to the sun for longer than 5 minutes on the first day and 5 minutes longer on each day thereafter. In all operational conditions, you should be fully clothed in loose garments. This will also reduce sweat loss.

YOU USE LESS WATER IF YOU KEEP YOUR CLOTHES ON!

The sun is as dangerous on cloudy days as it is on sunny days. Sunburn ointment is not designed to give complete protection against excessive exposure. Excessive sunbathing or dozing in the desert sun can be FATAL.

The combination of wind and dust or sand can cause extreme irritation to the mucous membranes, chapping the lips and other exposed skin surfaces.

Irritative conjunctivitis (irritation of the eyes), caused by fine particles entering the eyes, is a frequent complaint of vehicle crews even when wearing goggles. Lip balms, skin ointments, and eye ointments must be used by all personnel.

Climatic stress on the human body in desert heat can be caused by any combination of air temperature, humidity, air movement, and radiant heat. Your body is also adversely affected by such factors as lack of acclimation, being overweight, dehydration, alcoholic excess, lack of sleep, old age, and poor health. Your body maintains its ideal temperature of 98.6 degrees F by conduction/convection, radiation, and evaporation (sweat). The most important of these in daytime desert is evaporation, since air temperature alone is probably above skin temperature already. If, however, relative humidity is high, air will not easily evaporate sweat, and the cooling effect is reduced.

Fast, wind-blown sand can be extremely painful on bare skin, so this is one reason why you must always be fully clothed. When visibility is reduced by sandstorms to the extent that military operations are impossible, you should not leave your group unless secured by lines for recovery. You must carry pieces of cloth or bandannas to help cover the face and neck during sandstorms. Windblown sand causes you to turn your head and get off course while you drive. Keep this in mind, because you must compensate by buttoning up, taking constant compass readings, or using geographic reference points.

**Water, Dehydration, and Salt**

About 75 percent of the human body is fluid. A loss of fluid of two quarts (2.5 percent of body weight) decreases efficiency by 25 percent. A loss of fluid equal to 15 percent of body weight is usually fatal.

YOU CAN'T DRINK TOO MUCH WATER!
FILTERS OF ALL KINDS NEED TO BE CHECKED OFTEN!
POTABLE (DRINKABLE) WATER IS THE MOST BASIC NEED IN THE DESERT.

It is vital to ensure that there is no possibility of nonpotable (bad) water being mistaken for drinking water. Water that is not fit to drink, but not otherwise dangerous (it may have too much salt), may be used to aid cooling. It can be used to wet clothing so that the body does not use so much of its internal supply. Issued water containers must be carried only for drinking water. Sufficient water, plus a small reserve, must be carried on a vehicle to last you until the next planned resupply. In desert terrain, about 9 quarts of water a person each day is needed. Leaders need to make sure when subordinates are busy they drink 2 quarts of water an hour.

It is a good idea to erect shade for water trailers—it keeps the water much cooler. The best drinking water temperature is between 50 degrees and 60 degrees F. Lister bags or even wet cloths around metal containers help to cool water. Alcohol and smoking cause dehydration and should be avoided.

You must train not to waste water. Water that has been used for washing socks, for example, is perfectly good for a vehicle cooling system. Drinking water must be taken only from approved sources to avoid disease or water that may have been polluted.

Care must be taken to guard against polluting water sources. If rationing is in effect, water should be issued under close supervision of officers, noncommissioned officers, and designated leaders. You cannot be trained to adjust permanently to a reduced water intake. An acclimated soldier will need as much, if not more, water because he sweats more readily. If the ration is not sufficient, there is no alternative but to reduce physical activity or to restrict it to the cooler parts of the day.

In very hot conditions, it is better to take smaller amounts of water more often than to take large amounts occasionally. Drinking large amounts causes waste by excessive sweating and might cause heat cramps. As activity increases, you should drink more water.

SUNBURN CAN BE A KILLER IN THE DESERT!

The best containers for small quantities of water (5 gallons) are plastic water cans. Water in plastic cans will be good up to 72 hours, compared to

metal, which will only be good for 24 hours. However, you should change the water in your canteen at least every 24 hours. Water in water trailers, if kept in the shade, will last up to 5 days. If the temperature outside exceeds 100 degrees F, the temperature of your water must be monitored, and when it exceeds 92 degrees F, it should be changed because bacteria multiply. If not changed, you will end up with a case of diarrhea.

Ice in containers will keep water cool. If ice is put in water trailers, the ice must be removed before the trailer is moved because the floating ice in it will destroy the inner protection of the trailer.

Leaders—check out your soldiers' water and make sure it is cool and still drinkable!

During high desert temperatures, a resting person may lose as much as a pint of water an hour by sweating. In very high temperatures and low humidity, sweating may not be noticeable, because it evaporates so fast the skin will appear dry. Whenever possible, leave sweat on the skin to improve the cooling process. The only way to do this is to avoid direct sunlight on the skin. This is the most important reason why you must remain fully clothed.

Thirst is not an adequate warning of dehydration, because the sensation may not be felt until there is a body deficit of 1 to 2 quarts of water. Very dark urine is often a warning of dehydration. You do not always drink the amount you need and may need to be encouraged to drink more especially during acclimation.

NCOs and officers, be aware that you must keep track of how much your troops drink to ensure they drink enough water. Packets of artificial fruit flavoring will encourage consumption because of pleasant taste.

Salt in correct proportions is vital to your body; the more you sweat, the more salt you lose. All meals ready to eat have enough salt without adding salt. Too much salt may cause thirst, a feeling of sickness, and can be dangerous.

DON'T DRINK UNTESTED WATER!

**Desert Sickness**

Proper standards of personal hygiene must be maintained not only as a deterrent to disease, but as a reinforcement to discipline and morale. Daily shaving and bathing are required if water is available. Cleaning the areas of your body that sweat heavily is especially important; underwear should be changed frequently and foot powder used often. If sufficient water is not on hand, you may clean yourself with sponge baths, solution impregnated pads, a damp rag, or even a dry, clean cloth.

You should be checked for signs of injury, no matter how slight, as the dust of the desert and insects can cause infection of minor cuts and scratches. Small quantities of disinfectant in washing water can reduce the chance of infection. Minor sickness in the desert can have serious consequences. Prickly heat and diarrhea can upset part of the sweating mechanism and increase in water loss, making you more susceptible to heat illness. The buddy system can help ensure that prompt attention is given to these problems before they incapacitate individuals.

Intestinal diseases can easily increase in the desert. Proper mess sanitation is essential. Garbage is not to be buried within 100 feet of any source of water used for cooking or drinking. Burial area should be at least 30 yards away from the kitchen. Garbage pits 4 by 4 by 4 feet are suitable for 1 day for a unit of 100 men and must not be filled more than 1 foot from the top.

Trench-type latrines should be used if the soil is suitable, but must be dug several feet deep, because shallow ones become exposed in areas of shifting sand. They must be located at least 100 yards from unit messes and 100 yards from water sources. Latrines that are filled to within 1 foot of the surface must be closed. Excess dirt must form a mound 1 foot high, and the ground surface, 2 feet on either side, must be sprayed with an approved pesticide. The location must then be marked with a sign "Closed Latrine" and dated.

Diseases found in the desert include plague, typhus, malaria, dengue fever, dysentery, cholera, and typhoid. Some of these can be prevented by vaccines. Typhoid and cholera can be prevented by vaccines. Typhus and plague are transmitted by fleas and lice carried by rats and other animals. Proper sanitation and personal cleanliness can help prevent these two diseases. Dysentery can be caused by drinking impure water and contaminated foods—all water to be used for drinking, cooking, and bathing must be tested before use. Drink only bottled water if it is available.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Some soldiers tend to stay in thin clothing until too late in the day and become susceptible to chills, so respiratory infections may become common. You should gradually add layers of clothing at night, such as sweaters, and gradually remove them in the morning. When danger of cold weather injury exists in the desert, you must guard against inexperienced troops discarding cold weather clothes during the heat of the day.

Eating three well balanced meals a day helps to maintain the body's chemical balance. The temperature of your body is regulated within narrow limits: too little salt may lead to heat cramps; too little salt and insufficient water may lead to heat exhaustion.

A general collapse of the body's cooling mechanism will lead to heat stroke, which is potentially fatal. To avoid these illnesses, you must be physically fit, thoroughly acclimated, and drink sufficient water. If you expend more calories than you take in, you will be more prone to heat illnesses. Since you may lose the desire for food in hot climates, you must remember to eat the heavier meal of the day during the cooler hours.

Continued supervision by leaders and the use of the buddy system are important, especially for those personnel, such as mechanics, who work alone or in pairs. It is necessary to recognize heat stress symptoms quickly. When suffering heat from heat stroke, the most dangerous, there is a tendency for you to creep away from your buddies and attempt to hide in a shady and secluded spot; if not found and treated, you will die.

When shade is required during the day, it can best be provided by tarpaulines or camouflage nets, preferably doubled to allow air circulation between layers and dampened with any surplus water.

Skin diseases can be caused by polluted water. Untested water should not even be used for washing clothes, although it can be used for vehicle cooling systems or vehicle decontamination.

**Clothing and Necessities**

Standard lightweight clothing is suitable for desert operations, but should be a camouflage color, not fatigue green. Wear nonstarched, long-sleeve shirts and full length trousers with pants tucked into combat boots. Special clothing may be required by tankers, since they live in an environment of oils and greases with high risk of burns; this clothing must have an ability to "breathe." Jungle boots should not be worn, because sand will sift into them. A piece of cloth should be worn loosely around the neck. It is used to protect the face during sandstorms, as a sweat rag, and to protect much of the face and neck against sun and sand.

Combat boots will wear out quickly in desert terrain, especially if it is rocky. The leather will dry out and crack, unless a nongreasy mixture, such as saddle soap, is used.

Although difficult to do, clothing must be kept relatively clean by washing in any surplus water that is available. When water is not available, airing and sunning clothes will help kill bacteria.

Vehicle exteriors and tools can get extremely hot when exposed to direct sunlight even for short periods. Crewmembers and maintenance personnel must wear gloves to prevent first and second degree burns.

**Equipment Checklist for the Desert**

- Sweater, field jacket, a woolen scarf for cold and night use, and a cotton one for day use
- Sleeping bag
- Lip salve, anti-sunburn ointment, foot powder, eye drops, and insect repellent
- Bottled water
- Sunglasses and case (to prevent scratching when not in use)
- Lensatic compass, if available; web belt with 2 quart canteens attached
- Goggles
- Combat boots
- Gloves

AVIATION MEDICINE REPORT
Office of the Aviation Medicine Consultant

# Spatial Disorientation

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SPATIAL disorientation is a term used to describe a variety of incidents occurring in flight when the pilot fails to correctly sense the position, motion or attitude of his aircraft or himself in relation to the center of the earth. In some countries, particularly the United States, the term *vertigo* or *aviator's vertigo* is synonymous with spatial disorientation. But, as vertigo has a more specific meaning of "a sensation of turning" or "dizziness," the use of the word should be confined to this particular kind of sensory experience. Vertigo is a dizzy or spinning sensation caused by some physiological abnormality that is usually due to a medical problem. However, a pilot with vertigo may well be suffering from spatial disorientation. There are many incidents in which the pilot is spatially disoriented but does not have vertigo.

Nearly all aircrewmembers experience illusory sensations, aircraft attitude and motion, or failure to detect changes in aircraft orientation sometimes during their flying career. Such incidents are quite normal and are due to physiological limitations of sensory mechanisms.

Disorientation has two classifications. Type I is when the pilot does not realize that his perception of aircraft orientation is incorrect. Type II, the more common form of disorientation, is when the pilot experiences a conflict between what he feels is happening to the aircraft and the correct information on its orientation aircraft instruments provide.

Fortunately, only a small fraction of the disorientation incidents aircrewmembers experience has disastrous conclusions. Nevertheless, aircraft crash each year and aircrewmembers and passengers are killed because pilots fail to correctly perceive the orientation of their aircraft. The problem is not a new one. Early in the history of powered flight, it was recognized that limitation of sensory function could lead to loss of control, particularly when external visual cues for spatial orientation were degraded; e.g., when flying in clouds or at night. Yet despite progressive improvements to aircraft instruments and displays, which should allow the pilot to maintain correct orientation in all conditions of flight, accidents still occur. Most of these accidents are associated with poor visibility, often described as instrument meteorological conditions, when flight should be by reference to aircraft instruments, instrument flight rules. However, a few accidents occur in good visibility, visual meteorological conditions, and are due to misinterpretation of external visual cues.

Are there ways of reducing or, better yet, preventing spatial disorientation? Training and experience are clearly important factors that can help prevent spatial disorientation.

Training should include the following actions:

- Inform aircrewmembers about those factors that contribute to effective spatial orientation in the flight environment.
- Familiarize aircrewmembers with various conditions and flight operations that may lead to spatial disorientation.
- Discuss how to detect the onset or existence of spatial disorientation.
- Discuss the mechanisms by which spatial disorientation is produced.
- Discuss normal limitations of sensory functions.

Remember, nearly all disorientation is a normal response to the unnatural environment of flight. If a flight incident alarms you, discuss it with colleagues. Your experience will probably not be as unusual as you think.

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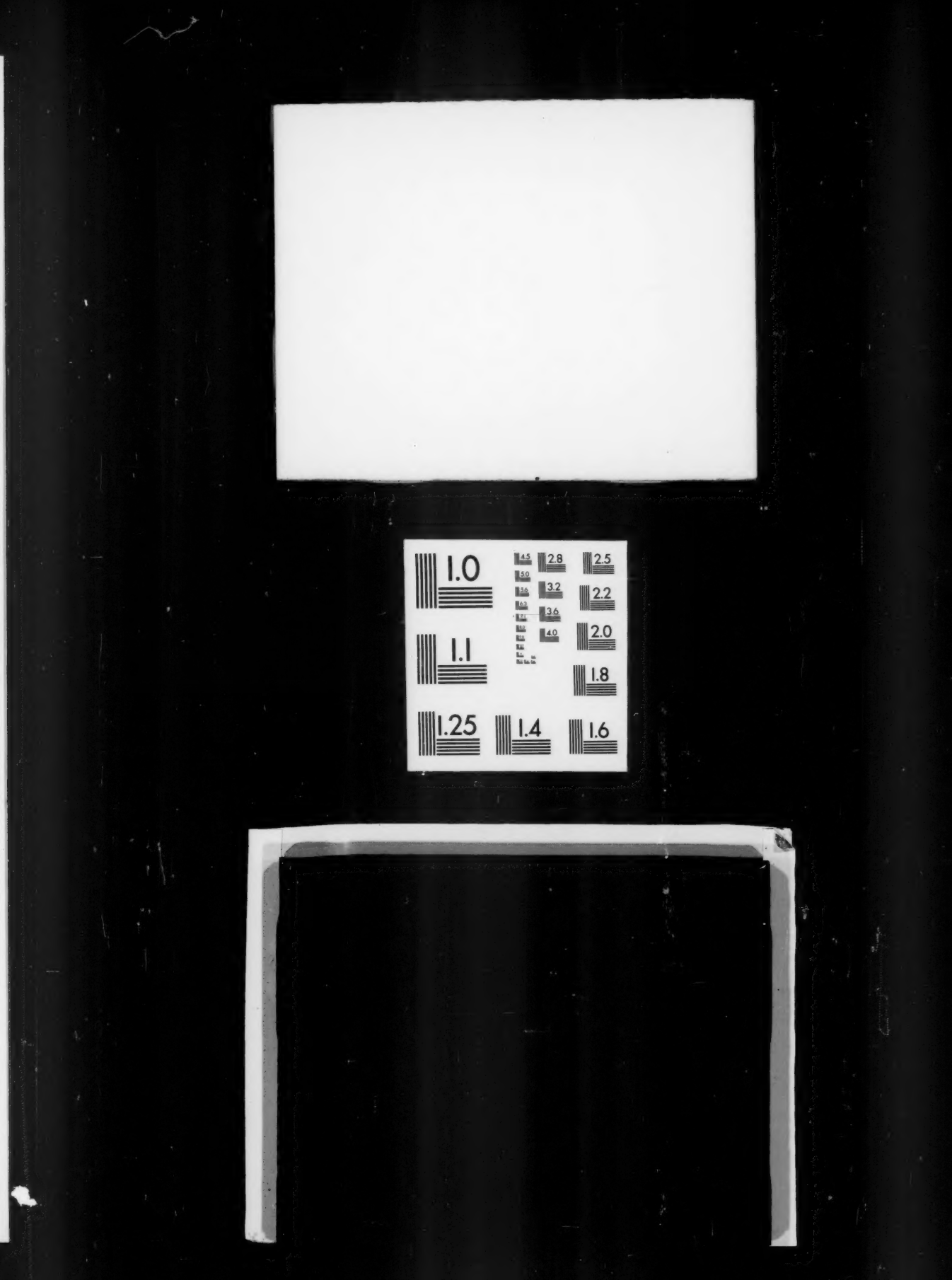
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